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Steam Plow.

The accompanying illustration of Redmond's steam plow is an accurate copy of a photograph taken of the machine at work in the field, drawing six plows, turning furrows ten inches deep and twelve wide. The trial was made before the construction of the gang of plows which is designed to go with the engine, and which we are informed will require the attendance of only one man, who will also, in most cases, attend to firing the engine. This machine has, we are informed, been tried in stubble and in sod ground, in rough and rolling land, and, it is claimed, has shown itself fully capable of drawing the six or seven plows that can be attached behind it.

Many attempts at locomotive steam plowing have heretofore proved failures, from the simple fact that the hold of the traction engine on the ground was not equal to the resistance of the plows. In the machine here represented that hold on the ground is secured by the protrusion of a series of twelve anchors through the rim of each wheel, which penetrate the ground as the wheel advances, and their withdrawal again into the wheel soon after the next forward anchor receives the strain. The pressure of the weight of the engine on the soil around each anchor is relied upon to prevent slip. As these anchors may be made of any required width and length, the traction of this machine is theoretically limited only by the power of the engine. The anchors, as shown in the engraving, are fluke-shaped, five inches at the widest point and seven inches long. They are pressed into the ground by a cam over a friction roller on the stem of the anchor; the cam is held by a coil spring which gives if the anchor meets with any unusual obstruction. The draft comes immediately upon it when pushed into the ground, while another fixed cam withdraws the next anchor behind, which, by the peculiar motion given to it through its arm in the wheel, lifts away from the ground it has been pressing against, producing no back strain or tearing up of the earth. Whatever force it takes to push in the anchors is a lifting one on the wheels, acting measurably to prevent them from sinking into the soil.

The turning is accomplished by a clutch on either side, which reduces the revolutions of one of the intermediate gear wheels by a third. It may be constructed so as to reduce speed by any other fraction if it should be desired. A very slight turning can thus be given either way, or a full turn may be made in a circle of twenty feet diameter for the inside wheel.

The boiler, which is estimated at about twelve horse power, is placed directly between the two driving wheels, and is connected to the hind carriage or tender by reaches hinged both at its top and bottom, thus keeping the engine always in an upright and stable position, and allowing it to cramp either way like the forward wheels of a wagon. It is a tubular upright boiler, made, like all the other parts of the machine, as light as possible, the weight of the whole being less than five thousand pounds. This might be considerably reduced by the use of steel in the place of iron. Two upright cylinders attached to the boiler work intermediate gear wheels by which the revolution of the drive wheels is reduced as one to twenty. One hundred and sixty strokes a minute is equal to a speed of two miles an hour. Plowing a strip seven feet wide at that rate would make over an acre and a half an hour. As the fuel necessary to keep up steam in these tubular boilers is very little, probably not over six hundred pounds of best coal per day, and as only two or three men, with a horse and water cart would be required to run the engine with a gang of plows, the expense of plowing with it in the large fields of the West and South is estimated to be not far from fifty cents an acre.

The tender carries a tank holding two barrels of water. On it is the seat, from which the engineer can reach and manage all parts of the engine and the steering, and even the draft of the fire-box in front.

The machine represented above is five feet ten inches wide from outside to outside of wheels, and it is designed to attach six plows, turning fourteen inch furrows, in two gangs behind and underneath the tender, the first furrow to be thrown mostly outside of the track of the wheels, in order that the machine may travel altogether on unplowed ground. In large wheels and in soils where there are not many obstructions, it is claimed to be practicable to attach a cultivator and a drill or planter behind the plows, thus finishing a field with once going over.

This machine will plow up hill, the only increase of power necessary being that which is required to lift its own weight up the incline.

The English system of steam plowing, which is in successful operation, consists of an engine on each side of the field, drawing a gang of plows back and forth between them by means of wire ropes. The advantages which the Redmond steam plow is claimed to possess are that it does not cost nearly as much; that it requires less attendance and less expense in running; that it will plow closer to headlands, etc., and will plow on rolling and uneven surfaces. The Redmond machine is light, and takes up but little more space than a team of horses before a plow, and moves itself on the road or in the field, up hill or down. We are told that a pressure of twenty pounds of steam has been found sufficient for its own locomotion.

It can be adapted to the purpose of stationary farmwork, as thrashing, sawing, etc., or as the motive power for reaping and mowing.

The patents for the United States and foreign countries were obtained through the Scientific American Patent Agency, and are owned by C. C. Merriman and Owen Redmond, of Rochester, N. Y., to the former of whom communications of those wishing to interest themselves in manufacture or purchase may be addressed.

REDMOND'S STEAM PLOW.

On Improved Appliances for the Production of Heavy Forgings.

Abstract of a paper read by Lieut.-Colonel Clay, of the Birkenhead Forge before the British Association.

The forging of iron in large masses is a subject of so much importance to our engineering industry that it needs little apology for its introduction to the mechanical section of the British Association, and any improvement in the machinery or appliances for the more economical or rapid manufacture of large masses of wrought iron, or for any improvement in quality, must be of great interest to all manufacturers where such products are needed.

These improvements in the manufacture of large forgings I intend to class under three heads. I propose simply to mention a few prominent facts very briefly, but shall be glad to answer any inquiries that members may require further information about. 1. Improved heating by Siemens' regenerative gas furnace. 2. Facilities for handling and moving large masses of wrought iron from the furnace to the hammer, and for moving them under the hammer. 3. Improved hammers, with a clean, unfettered fall, and with such width of standards as to give the workman all the comfort and convenience possible in executing the necessary operations of shaping, forging, and cutting the material to the required form.

1st. Improved heating by Siemens' regenerative gas furnace. It is generally admitted that iron in large masses is greatly deteriorated by long exposure to high temperatures, and that a crystalline structure is developed in consequence of such a form and nature as to detract in a very great degree from the strength of the material. It must, therefore, be admitted that furnaces such as those of Siemens', which produce the most intense heat in the shortest possible time, must cause less deterioration to the product in hand than

those which are slower in operation; but a more important item in this consideration is that the facilities given for regulating the admission of gas and air in a neutral flame can be produced, and, in consequence, the iron may be preserved from that burning and oxidation which are the cause of the formation of those large facets or crystals which weaken many wrought iron structures of large size to such an immense extent.

Another improvement from these furnaces where the iron is prepared from the pig is that the gas furnaces do not bring over the large amounts of unconsumed ash or *debris* from the coal which is usually deposited on the body of the iron made in the ordinary puddling furnace, and, in consequence, the iron is more free from those specks and flaws which are so observable in ordinary iron, and which produce the heating and galling so common in large forgings, as heretofore made, and which cause the chief torment of the practical marine engineer.

Perhaps the greatest advantage which the Siemens furnace offers is in the manufacture of forgings of puddled steel, from the facility in which the flame of the furnace may be regulated, first, in the puddling process, and, secondly, in the heating of the puddled steel masses. In furnaces of ordinary construction a constant deterioration of the puddled steel must necessarily take place from the free oxygen present in the furnace; but in the Siemens furnace the gases may be so regulated that a neutral flame is produced, and consequently, the steel mass is heated without deterioration.

I will not now enter into the question of economy of fuel, as this has been often discussed at meetings of mechanical engineers; nor will it be necessary to enlarge upon the great advantage, especially in large towns, of the absence of smoke, which has been hitherto thought a necessary nuisance in all branches of the iron manufacture.

The second improvement which I would wish to mention is improved facilities for handling and moving these large masses of iron when heated as above described, which is effected by hydraulic cranes and machinery of sufficient power to move these large masses almost instantaneously either from the furnace to the hammer or *vice versa*, to raise and lower the load, or to increase or decrease the distance of the load from the center of the crane.

The truth of the old adage, of striking when the iron is hot, will prevent any necessity of dwelling upon the advantage of rapidity of movement in dealing with large heated masses of iron. After the pieces of iron have been heated in the manner described, and when the machinery shown has brought the forging to the hammer, it is necessary that the instrument should be of the most approved description to cope with the material under operation in the best and quickest manner, and with the greatest possible comfort to the workman employed at the work designated. Hammers that are described as suspended are employed; they are carried upon wrought iron girders, of twenty feet span, which gives the hammer-man such room for his operation and such freedom from any obstacle to his work as have seldom, if ever, been accorded before, and so much room to the rear is reserved that shafts fifty feet or sixty feet long could readily be made without any inconvenience.

THE LABOR MOVEMENT IN ENGLAND.

Lecture of Thomas Hughes, M.P., at the Cooper Institute, New York.

An immense and intelligent audience assembled in the hall of the Cooper Institute on the evening of the 21st October, to listen to a lecture from Thomas Hughes, M.P., on the Labor Movement in England. Mr. Hughes has long prominently identified himself with the interests of labor in England, and his address is the most able review of the subject we have ever met with. We therefore have deemed it eminently fitting, in order to give his views as wide a circulation as possible, to publish an abstract of his remarks, which were listened to with the most earnest attention, and which for soundness of conclusion, elegance of diction, and able presentation of fact, is worthy of most careful and earnest consideration on the part of the working men of this country.

LABOR MOVEMENT IN ENGLAND.

In England, said Mr. Hughes, the war between labor and capital has lasted, with occasional lulls, for upwards of five hundred years. Far back in those dim old Plantagenet times we find the traces of that war on the statute book, and in the pages of the chroniclers. The Statute of Laborers and other acts endeavored to fix the rate of wages, and the conditions under which handicraftsmen should be allowed to dispose of this labor. After the black death had devastated the southern and eastern counties, the most stringent laws were passed in the hope of checking the rise of wages which that fearful calamity had caused. Scarcely more than one smith or carpenter in four was left in some of the fairest and most populous of English districts; but king and baron, and bishop and merchant could see no reason why they should have to pay more for the skill of one survivor. The first great strike of which we have any record whatever, so far as I know, took place among the masons and other artificers employed in building Windsor Castle under William of Wickham.

They left their work and scattered over the neighboring counties; but the sheriffs of Berks, Bucks, and Surrey soon brought them back in obedience to the peremptory mandate of King Edward, and savage punishments—in one instance, if I rightly remember, the last penalty of death—were inflicted on the ringleaders.

And so the vicious system went on for centuries through the Tudor and Stuart and Hanoverian times. Now and then, as liberal counsels prevailed and wiser statesmen were at the head of affairs, we find attempts at legislation in the interests of labor to break the dull record of short-sighted selfishness. But not until our own age had come did it occur to our statesmen and people that the only wise thing for the country represented in its Legislature was to stand aside and allow the rate of wages and the condition of labor to be settled by those most interested. It was not a moment too soon. The great war of the Revolution had thrown nearly all the producing trade of Europe into the hands of England, and the rapid accumulation of wealth and the inventions in machinery had gathered the work people together in large factories.

Secret societies had sprung up all over the kingdom in defiance of the law, and when the bad years had followed the peace of 1815, and wages fell and fearful distress prevailed, violent outrages, arsons, even murder, arising out of trades' disputes, became fearfully common. At last in 1825 Parliament made a clean sweep of all the cruel, wicked, and foolish old laws, and declared that in future combinations of working people for the purpose of settling the rate of wages and the hours of labor should be no longer unlawful.

REPEAL OF THE COMBINATION LAWS.

From the repeal of the combination laws in 1825 the modern history of our labor movement dates. Beneficent as that legislation was, it was far from perfect. It has been described as "a solemn duelling code between capital and labor," and not without reason. We have had to supplement it in several directions. First, by protective legislation, such as our factory acts, which we have passed to prevent the over-working of women and children, of which it was confidently predicted that they would reduce wages and diminish production, while the workers would misuse the leisure provided for them. The exact contrary has happened. Wages and production have increased, and the people, on the whole, use their leisure admirably.

Again, we have had to supplement it by enabling legislation. After the bitter experience of more than a whole generation, we have fairly acknowledged that it is not sufficient to have combinations of employers or of work-people outside the law; to say you may combine, but the courts cannot recognize your combinations or protect your property. It is only within the last two years that England has come to this wiser mind, and has resolved to bring all unions resolutely within the pale of the law, to compel them to publicity, and to make them bodies legally recognized and legally responsible. To return, however, to 1825. The unions soon learned to make use of their new powers, and a local civil war broke out all over the country. The sad words of one of your ablest economists may be taken with scarcely a qualification as descriptive of that time:

"Capitalists may encroach on labor; laborers may, in their madness, destroy capital; such is the work of ignorance and evil passions. But, however far such strife may be carried, it can only result in mutual injuries, and health can only be restored by obtaining the recognition of the full rights and obligations of each. The condition of well-being is peace. A false philosophy has set the world at war for ages, proclaiming that what one nation gains another must lose. Such a philosophy has had its trial, extending over centuries of waste and terror, and it is now fortunately dishonored through the whole civilized world. Akin to it is the belief that hatred and retaliation are the normal conditions of capital and labor, and that mutual distrust and hurtfulness are inevitable in all the developments of industry. Such a belief blasphemes the harmonies of Providence, is sightless before the glorious order of man and nature. The cruel, shallow selfishness of capital has robbed labor by means of law. Labor, impoverished, ignorant, degraded, has often turned upon its tyrant, and laid in a common waste church and state, letters and wealth."

EVIL EFFECTS OF STRIKES.

It is needless to dwell upon a state of things which has passed away, or to endeavor to fix blame on either side in the long struggle. The frightful waste and misery inflicted on employers and work people by strikes and locks-out, the widespread ruin of families, the danger to our trade, as well as the heroism and self-sacrifice which not seldom lighted up those civil conflicts are now, I trust, matters of history. The war ended, as so few wars do end, without the complete discomfiture of either side, and how a better state of things has come about I must try and tell you in a few words.

After some twenty years of strike the work-people found that they were unable to contend with their employers in their isolated local unions, numbering a few hundred men. They determined to extend their organization so as, if possible, to embrace whole trades. The first experiment was made by the engineers and machinists. About the year 1849 these men, who are, of course, among the most able and skillful of our mechanics, formed a vast federation of societies, and called it the Amalgamated Society. In 1851 it numbered 12,000 members, scattered through branches all over the kingdom, and had a reserve fund of some £22,000. Then came the first, and, I am proud to say, the last, great trial of strength with the employers, so far as this society is concerned.

After four months of misery, in which, at the lowest calculation, the men lost £150,000 in wages, the struggle ended in their total defeat, and left the society without a penny of reserve fund, heavily in debt, and with the loss of more than a quarter of its members; and it was thought that trades'-unionism had received its death blow. Never was there a more vain calculation.

SUCCESS OF TRADES' UNIONS.

The Amalgamated Society recovered itself with marvelous rapidity, and has gone on increasing till the present time, when it numbers some 40,000 members, has more than 300 branches—some twenty of which are on this side the Atlantic, and a reserve fund of £100,000. The example of the engineers was followed in the building trades, the iron trade, the coal trade, and other of our leading industries. On the other hand, the employers in these trades also combined in large societies, extending often over whole districts. At last the two armies stood opposite one another, marshaled for battle on such a scale that every trade dispute threatened to carry ruin and misery into every corner of the kingdom. But while this state of things had been growing, better counsels had begun to prevail.

The wiser and more humane of the employers and of the leaders of the work-people, staggered at the magnitude of the interests involved, and the bitterness and woes of the struggle, had for years been advocating the establishment of courts of arbitration and conciliation for the peaceable settlement of all trade disputes. At length these wiser counsels took shape and bore good fruits.

The honor of establishing courts of arbitration and conciliation, first in his own trade at Nottingham, and afterwards in all parts of England, belongs in great measure to Mr. Mundella, the member for Sheffield, who is now in this country, and, I believe, in this city. I have no time to give you details about them. Suffice it to say that they are established in all the great industries of the kingdom, and that almost all the most powerful unions have inserted in their rules a positive prohibition of strikes until after the questions in dispute have been before an arbitrator and council of conciliation.

It may be too sanguine to say that great strikes are evils of the past, but every day shows that in the future they will be gross outrages on the moral sense of the community, and the offending parties will have all England against them.

You may be interested to hear how the courts are carried on. In January last I went down to hold one at Middleboro', the center of the north of England iron district. Trade had revived, and though some advance had been given, the men thought they were entitled to more. The dispute had become bitter. The interests involved amounted to millions. The court sat in the town hall; fourteen employers, the leading men of the district, on one side of a long table, fourteen men from the works of these employers on the other. We sat for two days. During the first day hard things were said, and blunt contradictions as to facts and figures flew about. On the second day the angles seemed to have been rubbed off, and both sides spoke quietly and fairly. At the end of the day the employers went into one room, the men into another. I carried proposals backwards and forwards for perhaps half an hour, and at the end of that time had the happiness of getting the signatures of both sides to an agreement which settled all questions in dispute, and bound employers and workmen for a whole year.

COURTS OF ARBITRATION.

But if matters rested here with us I should still be doubtful for the future of the labor question in England. At the best, courts of arbitration leave the standing armies untouched, and even involve the necessity of keeping them highly organized. While there are standing armies there must be always danger of war, whether between nations or classes; but I trust that we, in England, are on the sure road to getting rid of standing armies altogether, or, at any rate, in the industrial world.

It is by the co-operative movement that this blessing seems likely to be obtained, and to this I must now turn. It is a great subject, perhaps the greatest which the social reformer has to deal with. No one can be more conscious than I am of the utter inadequacy of any sketch I can give you in such a lecture as this, and there are many friends in this room who will remark the many gaps in what I have already said and what I have yet to say. However, I can but do my best, and hope that what I say may, perhaps, lead those most interested in these questions over here to study our industrial history of the last forty years more in detail.

CO-OPERATIVE SYSTEM

In the midst of the worst years of the great labor war which I have been speaking of, when masters were asserting their right to do what they would regardless of their men, and men were ready to starve if they could only injure or defeat their masters, the co-operative movement commenced, so far as the scope of this lecture is concerned. I leave on one side co-operation for purposes of distribution, which began somewhat earlier, although it has been, as yet, by far the most successful. Under it the working people throughout the whole of the north of England have established stores of their own, which supply them with pure and unadulterated articles at cost price (for all profits on purchases are divided periodically among the members). They have delivered themselves from the thraldom of debt to the small shopkeepers and publicans, and have restored tone to trade outside their own body.

The system of ready money payments is spreading widely wherever co-operative stores flourish. But it is association for production, a far harder reform to carry out, with which we are concerned, and this had scarcely any existence in England till after the French revolution of 1848. All of you who care for these questions probably remember the establishment of the workmen's associations in Paris at that time. The National Ateliers were founded on false principles, for political purposes, and failed grievously, but many other associations established by the *ouvriers* themselves flourished for years; indeed, some of them were still in great prosperity down to the breaking out of this sad war. Well, some Englishmen who had seen or knew about them, resolved to try the experiment at home, feeling sure that in this direction, however difficult the path might prove, lay the true solution

of the labor question. We formed in London a society for promoting workingmen's associations, and assisted a number of bodies of men in the building, tailoring, shoemaking, and other trades, to start in business for themselves, under rules which provided that all those employed in the work should share in the profits. The same thing was done in other parts of England, and in other branches of industry. I will not trouble you with details. Most of these associations failed, a few succeeded and remain to this day, but the experience gained was sufficient to convince all who took part in the movement, on the one hand of the truth and power of the principle, on the other hand of the exceeding difficulty of carrying it on to practical success without the aid of those who had grown up with the knowledge and experience of conducting manufactures and businesses. We had to admit with some sorrow and disappointment, that it would probably take a generation to educate men of the working class so as to fit them for the successful management of a productive association. If the reform was to come speedily, it must be by the help of the employers. But here the law again stood in our way. An employer could not give his work-people a share in profits without making them partners, and so giving them a right to take the accounts of the business, interfere in its management, and so jeopardize his whole fortune. The first thing to be done was to alter this law, but this was not effected till 1865. On the 5th of July in that year the act to amend the Law of Partnership was passed, and from that time it became possible for employers without legally risking their all to associate their workmen as sharers in the profits of their businesses. This act was not long in bearing fruit. In that same autumn the principle was adopted by employers in several trades. As the best way of showing you how the new system was adopted and worked out, I will confine myself to one experiment now widely known, and the most successful of all, so far as I know of, to the present time—the Methwood Collieries of Messrs. Briggs & Sons.

ITS SUCCESS.

Mr. Henry Briggs, the head of the firm, was a successful coal master, and owned large pits in the Yorkshire district. He was a resolute, upright Yorkshireman, kind and generous to all about him, but above all things determined and unflinching wherever he believed himself in the right. Such a man was sure to be in demand as a leader, and accordingly Henry Briggs had been for years the chairman of the Masters' Association of coal owners in his own district. This association had been uniformly successful in its contest with the coal-workers, and so bitter was the feeling there that "the coal owners are devils, and Briggs is chief of the devils," had passed into a proverb.

In 1864 and the beginning of 1865, things had come to such a pass that the Methwood and other collieries were standing still often for weeks together, and when in work, had to be protected by a large body of police. Mr. Briggs at last got thoroughly sick of living in a constant state of war with his poorer neighbors. Collieries were returning scarcely five per cent on capital. He proposed to his sons to sell the mines and invest their money in some other way which would bring them at least as large a return, and peace. Fortunately, as I believe for England, his sons had been attracted by the theories of co-operators, and proposed to their father to try what effect giving the work-people a share in profits under the new act would have on their business. Things could scarcely be worse, and persons who had been studying and preaching on the subject for years declared that they could be better. Mr. Briggs consented, and the first industrial partnership was accordingly formed at the Methwood Collieries.

The manner of its formation was as follows: The stock plant and other property were valued, nought being set down for the good will of the business. The valuation amounted to something over £80,000. The sum was divided into shares of £10 each, in order to place them within reach of any prudent workman. The first charge on all the earnings of the collieries, after payment of the current rate of wages of the district to the work-people, was a payment of ten per cent on the capital, that being the rate which, according to the best authorities, money invested in coal mines in England ought to bear. All surplus earnings, if any were made, were to be divided equally, half being paid as additional interest on capital, the other half being divided among the work-people as a bonus in proportion to the amount earned by each of them during the year. The articles of this Industrial Society were duly registered. The Messrs. Briggs kept the larger part of the shares in their own hands, and the rest was sold to friends of the movement and to the work-people, arrangements being made by means of share clubs to enable the latter to pay up their shares by small weekly installments. So great was the suspicion among the men, that although the matter was thoroughly talked over with them, and explained, scarcely one of them would take a share. Messrs. Briggs, for the sake of convenience, made it a condition of sharing in whatever bonus might be earned, that each workman should take out a penny book, in which the amount earned by him, and upon which, therefore, bonus should be payable, should be entered by the proper clerk at the end of each week. Only about one tenth of the nine hundred work-people employed took the trouble to take out this book. However, the leaders were determined to give the scheme a fair trial, and accordingly, though there were many threatenings, no strike took place during the first year. At the end of that time it was found that after putting aside a reserve fund of several thousand pounds, something more than thirteen per cent had been made on the whole capital, and there was accordingly a sum of more than fifteen hundred pounds to be divided among the holders of books as a bonus on their earnings. I went down to the meeting in the great room at the collieries where this announcement was made of the result of the first year's working, and I shall not easily forget the scene at the great tea-party, the hearty speeches predicting the good time coming, the importance and delight of hard-handed fellows carrying in their pockets more coin than they had ever seen before at one time, the blank looks and good resolutions of those who had neglected to take out books.

CONFIDENCE IN THE SYSTEM.

They all took out books next morning, and I came away with a very firm faith in the future of the first industrial partnership of Briggs & Co., limited. That confidence was well grounded. From that day to this the success has gone on increasing. A large proportion of the work-people now own shares. One of their number has been elected on the Board of Directors. The dividends have never fallen, and have in some years advanced largely. The economy in material, such as timber and oil, has been sufficient to pay a dividend of (I believe) more than 1 per cent. Above all, while there have been many disputes and stoppages of work in the district, the Methwood Collieries have never lost a day, and the feeling between the Messrs. Briggs and their work-people is as cordial as the strongest philanthropist could desire.

ENGLAND AND THE UNITED STATES—A CONTRAST.

I have now given you very imperfectly, but I believe faithfully as far as I have gone, an account of the great industrial movement in England. I am not sanguine enough to hope that all our troubles are over; but I do believe that all serious danger for us is past, and that if we lose the lead, which according to the latest returns, we still hold among the producing nations of the world, it will be because we are fairly beaten in invention or applied skill, or in that dogged persistency in work which has hitherto done so much for us, and not because our employers and work-people are engaged in the time-honored and world-old pastime of cutting each others' throats. Is it as well with you here, my friends? Have you nothing to learn from the old country in this matter? Well, it is exceedingly difficult for a stranger coming among you for a few months to judge, but, unless I am mistaken, I see the threatenings of trouble for you over this labor question. Labor and capital in the New World seem inclined to ignore or dispise all the lessons of the Old, and to fall together by the ears, instead of marching together hand in hand toward the grandest work the earth can offer just now—the subduing and development of this vast and magnificent continent of yours.

ADVICE TO WORKING MEN.

I have no right to offer counsel on either side, and may possibly be even regarded with suspicion by employers of labor over here, as I have been till lately by those of England But as I have helped the working men at home to fight their battles, and have had the happiness of earning their confidence, I trust their brethren here will take the few words I have to say to them in good part, and as those, at any rate, of a friend. Is it then the fact that you, the working men of the United States are running simply on the old tracks, and are furbishing up the old weapons of trades-unionism, which have so often run into the hands of those who wielded them? Are you really trying by your organizations to control the free will of those of your body who are not Unionists—to put restrictions and limitations on the hours of labor, the admission of apprentices, the use of machinery, the rate of wages, and to carry out your ideas by the old method of strikes? These things have been done often enough in England. If not wise even there, at least they had a justification which here is wholly wanting. Where the labor market is overstocked, and there are often two men waiting for one man's place, I can understand, and have often sympathized with and defended rules and practices intended to spread work evenly, and requiring self-sacrifice from the ablest workmen that all of fair capacity might earn a livelihood.

Where all the natural wealth of the country (if I may use the phrase) is already monopolized, where land, mines, waters—all the raw material out of which wealth is created—are in private hands, and there is the keenest competition for the use of them, as there is with us, one must not be too critical as to the methods by which the great body of producers have endeavored to secure their share of the products. But here you have well-paid employment waiting for every man who is ready to do an honest day's work. Here the natural wealth of the country is, for all practical purposes, unappropriated, and lying around you in almost unbounded profusion. You have nothing to do but to exercise a little thrift and foresight for a few short months, to spend for that time less than you earn, and there are the means in the hands of every one of you of obtaining house, land, whatever form of wealth you are most eager for, with only too great facility.

CAUTION TO TRADES-UNIONISTS.

On what possible plea of reason or justice or necessity, or even of hand-to-mouth policy can you undertake to control or limit the right to work on his own terms, in his own way, of any man, when there is ample room for twenty times your present numbers, and your land is crying out for all the work which every man among you can put into it? When the great trades' unions of England are becoming every day more peaceable and reasonable as they become more powerful, and are jealous of every expenditure which is not for some provident or benevolent purpose, are the unions and the working men of America going to pick up the old armor, instead of leaving it to rust where it lies, and to spend the earnings which belong to their wives and children as much as to them, in a crusade for preaching the gospel of idleness? I cannot believe it, for if there is one truth which this nation has hitherto preached faithfully to the rest of the world it is the gospel of work

The worth and nobleness of good hard work is the best outcome of your history, so far as I can read it, and the signs that the old belief is not dead, are among the most cheering memories which I shall carry back with me. I have the pleasure of knowing a senior classman at Harvard College who hired himself out as a laborer this last vacation, in order to learn the business of farming from the beginning, and earned $10 a week besides his keep At Cornell University the students who live by their own labor, in the printing house or on the farm, are precisely on the same footing as all the rest, and one rejoices to find that no one will lose caste there by the performance of honest work.

But if you here have something to learn from England as to the best method of settling the old dispute between labor and capital, so as to secure the highest results, I am bound to admit that when these results are attained we have more to learn of you as to the way in which wealth should be spent, for you seem to me to have realized, more than any other people among whom I have been, that the produce of labor—the wealth which flows in upon your citizens in such full measure—should be held and used as a trust and benefit, not of themselves and their families only, but of the whole commonwealth, and in time of the whole human race. I have lately been staying with my friend Mr. Goldwin Smith, at Ithaca; he, as you all probably well know, is a professor in the Cornell University, and let me add that England could send you no better man to help on the work which is doing there.

Mr. Hughes closed his address with an eloquent tribute to the liberality of wealthy American citizens in contributing to public benefactions, alluded in feeling terms to the kindness with which he had been everywhere received in America, and closed with a farewell to his audience, announcing that he should sail for England on the 22d of October, the next day after the lecture.

CHLORALUM—A NEW ANTISEPTIC.

BY PROF. JOHN GAMGEE IN THE "CHEMIST AND DRUGGIST."

The hydrated chloride of aluminum is a salt, which, as a preservative of organic compounds, I have made the subject of numerous experiments for some months past, and the more I work with it the more am I surprised that it has not been used in medicine. That, in common with other aluminous salts, it has the power of arresting decomposition, may not be altogether unknown; and what I claim as the result of my researches is, the recognition of its extraordinary value as an antiseptic—indeed, as a substitute for the very poisonous solutions of chloride of zinc—the caustic carbolic acid, which, from its smell, cannot serve for many purposes; chloride of lime, which evolves the most unpleasant fumes when used in water closets or elsewhere; the permanganates, which stain; and sulphurous acid, which cannot be conveniently used in hospitals or in the sick chamber.

Two obstacles have presented themselves to its prompt introduction into general use. The first is the source of supply, and the second the name.

Since the chloride of aluminum has never been a commercial article, and it was important to secure large quantities at a moderate price, half a tun was first made to determine the best method of production. Supplies can now be insured at a cost not exceeding that of the poisonous chloride of zinc, and below that of carbolic acid—indeed, so far below carbolic acid that it must supersede this where disinfectants are used in abundance—to water streets, closets, alleys, etc., which are now often redolent of the tar acid odor, that by no means finds favor in every household.

Secondly, as to the name. An antiseptic and disinfectant of such a character as this non-poisonous chloride, cannot be too widely used. That a long scientific name is an objection in a commercial point of view, and attended with great inconvenience, every one will admit. Carbolic acid is usually termed "carbonic" acid by the people, and every chemist is called upon daily to check popular blunders in naming articles asked for across the counter. I recently heard a respectable youth ask a dispensing clerk for "evorescing," and I was astonished to see a bottle of effervescing citrate of magnesia opened to supply the demand. I have consulted several medical friends and chemists as to the best popular name for the hydrated chloride of aluminum, and after many fruitless efforts, have determined on calling it "chloralum." I am aware of the objections to be raised to this, but since I searched for a single word whereby to designate it, one that would, in some sense, indicate the nature of the compound, and at the same time be quite new, I have resolved to adhere to a name which, like telegram, may become popular in spite of classical objectors.

All this matter of business may seem irrelevant; but only those who have happened to introduce some novelty are aware of the insurmountable barriers which present themselves in commerce.

And now, referring to the more pleasant part of my revelations—the results of experiments—it is not unimportant to state, that in January last I had to pay from 12s. to 24s. per per pound for small quantities of the chloride to be found in the shops of manufacturing chemists in London. I did hear that the Messrs. Bell, of Newcastle, had supplied the anhydrous chloride to be mixed with size by Manchester cloth dressers; but, on application to this firm, I was told they had discontinued the manufacture of the metal, and, therefore, had none of the chloride. With the small quantities I could find, amounting in the whole to less than a couple of pounds, I made solutions of much greater strength than I have since found requisite, and immersed raw hide, meat, the feet of cattle cut off at the knee, rough fat, and other agents, for various periods, varying from a few minutes to twenty-four hours. The result was absolute preservation, and, what is more as-

tonishing, after keeping these specimens up to the present time, I find no insects attacking them, as in the case of other means of preservation, even with arseniates.

Meat dipped in solution of 1·030 to 1·040 specific gravity, had a strong astringent flavor; but a retriever dog did not object to make a daily meal off flesh thus preserved, and thrived well on it. I knew from previous work that this chloride was non-poisonous; but I repeated my experiments to satisfy myself on the point, and then commenced preserving fish. I tried large quantities of plaice, soles, cod, whiting, mackerel, haddocks, mullet, and other kinds. Some were bought when far from fresh, and a dip purified them and arrested decomposition. A flabby cod, of suspicious appearance, became firm, and was good eating after a day's immersion. We had the least success with the mackerel and mullet, and, as a rule, none with the fish that had not been cleansed.

Mr. Frank Buckland aided me in procuring salmon from Thurso, Aberdeen, and Galway, dipped in the solution, when caught, and sent up to London without ice. All the fish arrived in good order, and kept several days. A sea trout was dipped in the solution in Aberdeen, exposed to 80° for thirty hours, and then sent up in a box. Mr. Buckland and Mr. Brudenell Carter tasted the fish, and coincided in the judgment formed of it in my household. The trout was firm and and of excellent flavor, and, in both respects, contrasted favorably with salmon that had been transported in ice. The result of these experiments was, that the fish would bear immersion for five or six days. The scales softened, and the flavor was somewhat affected by longer immersions. Slices of fish were apt to discolor and lose their flavor in a much shorter time than whole fish; but a salmon split in two would dry slowly and prove good eating many days after being caught. As an aid in the drying of cod on the Newfoundland coast and elsewhere, a mild solution of the chloride would be invaluable, since thousands of tuns of fish have to be thrown away, when caught in abundance, because they can not be dried fast enough.

The chloride of aluminum is a deliquescent salt; but it has a tendency to part with its chlorine, and thus no obstacle is offered to the drying of the fish. These experiments show how safe an agent chloralum is, and every medical man can appreciate the importance of having an inoffensive agent to be used in the sinks, dust-holes, and accumulations of filth and garbage in and around kitchens. A raid on the dust-holes and dust-pans is, probably, next in importance to the disposal and disinfection of sewage, and physicians have never had an antiseptic at their disposal which could safely be used in the dirtiest corners of most dwellings.

For ordinary disinfecting purposes, solutions varying from 1·006 to 1·010 specific gravity, are quite strong enough. Stronger solutions are usually unnecessary, and impart flavor to edible substances.

Any one who wishes to try a convincing experiment as to the value of chloralum, should drop some in strong sewage water. The solid matter is precipitated more rapidly than by the use of a persalt of iron, and the odor disappears. I am quite satisfied that it will aid those who are attempting to deal with the sewage of towns by combined mechanical and chemical means when irrigation is impracticable. It has one great virtue, which Dr. Budd, in a letter to myself, says must belong to "the antiseptic of the future," viz: that it is quite harmless to vegetation. The chlorine combines with ammonia and other bases, and alumina is deposited with the solid organic elements. In the dead house, the dissecting room, museum laboratory, chloralum will be found invaluable.

It is most important to increase the number of agents available for sanitary purposes. The destruction of animal poisons, so much neglected a few years since, marks an epoch in medical history which is in pleasant contrast to the days of long prescriptions and infallible cures. Cattle-plague times, fortunately, brought into fashion the stamping out of a malignant contagia, and, for this purpose, a good antiseptic, which cannot do harm, offend the most delicate nose, nor soil the finest linen, is a great desideratum.

I have striven to show, for years past, that we have a very distinct and destructive group of diseases in animals—the epizootics proper—propagated through time and space by contagion. Wherever these expizootics appear, antiseptics are of great value to destroy the virus as it is thrown off by the sick animals. All excreta should be disinfected, and all agents which are at all likely to be contaminated by the breath or discharges.

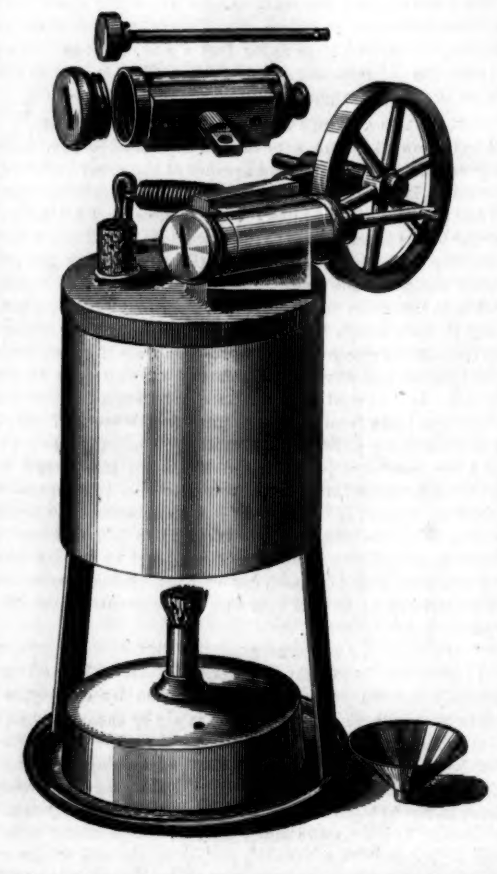
In the contagious pleuro-pneumonia I noted, some years since, that mild cases are controlled, and even cured, by astringent preparations, such as the sesquichloride of iron, and in the earliest stages of exudation, the internal use of chloralum would tend to limit the disease. It must be understood that I do not advocate treating cases of pleuro-pneumonia, except when special circumstances render it very desirable to do so. As a rule, the animals do best without medicine, but the early exudation occurs rapidly, much in the same way as hemorrhage and hemostatic properties of the chlorides of iron and aluminum render good service.

In the foot and mouth disease, which should never be permitted to reach our farms, a chloralum solution checks the discharge, destroys the virus, favors the cicatrization of ulcers, and may be regarded as the best remedy to be used.

In conclusion, I wish to direct the attention of surgeons to the use of the hydrated chloride of aluminum in the treatment of wounds, erysipelas, gangrene, and various contagious inflammatory diseases of the superficial parts, such as the contagious ophthalmia of children, soldiers, etc. In fever wards, and every sick chamber, gargles and lotions containing it will frequently be found of use, and linen can be dipped in solutions of it before removal from the sick chamber. It is a powerful styptic, and, in the treatment of chronic and acute discharges, hemorrhage, etc., it is of great value. It is sufficient to have drawn attention to this subject, to insure the multiplication of experiments; and the more the new compound is tried, the better will it be appreciated.

A DOLLAR STEAM ENGINE.

An article published some time ago in the SCIENTIFIC AMERICAN called for the invention of a cheap toy steam engine. In response to that suggestion several inventions have been made. Our engraving illustrates an engine of this kind, which is sold for one dollar. The parts are shown in detail, and any one at all familiar with steam engines will see at once the simplicity of its construction.



It is a reciprocating steam engine with cylinder, piston, fly-wheel, boiler, and patent safety valve, taking steam at both ends of the cylinder, with half inch stroke. All complete it weighs less than four ounces.

It is manufactured and sold by Colby Brothers & Co., 508 Broadway, New York, whom address for further information.

The Cable System of River Navigation in Germany.

The Frankfort correspondent of the Chicago *Republican* writes that the cable system of navigation is, at the present time, making rapid progress in Germany. This system prevails on the whole course of the Elbe through the kingdom of Saxony, and to some extent in the neighborhood of Magdeburg, and its extention into the interior of Bohemia on the one hand, and to Hamburg on the other, is projected, and is expected to be completed in a short time. On the Danube and its affluents the laying of a wire cable by the Danubian Steamship Navigation Company (Donau-Dampf-schiff farthgeselschaft) is being quickly and energetically prosecuted. The laying of one along the Rhine in Westphalia has already been completed. It is also intended to make this fresh invention available for the smaller streams of Germany, as, for instance, on the Saale and the Unstrut, for which the civil engineer, Opel, of Merseburg, a little while ago, recommended the laying of a wire cable instead of the proposed construction of a towing path. This system of cable navigation (either by ropes or chains) is likewise cheaper than the use of towing paths, and by this method, also, the possessors of land and other property on the banks of rivers are spared many inconveniences and unpleasantnesses, which are otherwise unavoidable. Opel has also shown the superiority which cable steamers possess over paddle-wheel steamers, since the former cause no ripple. This system has likewise an advantage in point of economy, since a steamer working on a chain or rope can make use of from ninety to ninety-four per cent of its steam power, while a paddle-wheel steamer can only use sixty per cent, and even, in case of a strong current, only thirty per cent. As a rule, says the *Bearbeiter*, the passenger boat with a forty-five horse-power engine must discontinue its voyage at high water, while a towing steamer with a fourteen horse-power engine holds the navigation open. The cable system of navigation can go on undisturbed in general so long as the sluices remain in good working order. While, on account of the inundation, etc., the towing path is inaccessible, such hindrances, on the contrary, form no obstacle to the steamer on the cable; or, at most, it only requires somewhat more coal, if the current be strong. The most important argument, however, in favor of the introduction of this system of navigation by means of a cable laid along the bed of the river lies in the fact that a certain plan can be held; the failure of navigation lies principally in this, that the condition of the weather, or the negligence of the captain, may cause an unpunctual arrival of the cargo at its place of destination. The journey from Magdeburg to Hamburg, by means of the cable system, can be accomplished in three days, while now often four weeks are required. Tremendous as the difference is, it is, nevertheless, given as a fact by the above named paper. There are two difficulties which present obstacles to the introduction of this system on some streams; for instance, on the Rhone and Saone, in France, this method of river navigation is not possible, because those rivers convey with them too great a quantity of sand, and thus clog up the cable. The other difficulty is the sharp bending of streams, as in the case of the Saale; but the impediment can be overcome to some extent by attaching fewer boats to the tugging steamer. The *Bearbeiter* makes the remark: "If we cannot succeed so far as to see thirty boats dragged one after the other on the Saale, as on the Seine, we must, for the present, be satisfied to transport three or four." On the Oder, also, this system is about to be adopted; but this river has, in one place, only a depth of fifteen inches; and it is, therefore, necessary to build the vessel according to the nature of the stream. On the Elbe, with from seventeen to eighteen inches of depth, it succeeds well, and the investment has realized from 9 to 12 per cent. In the Saale, at low water, there is a depth of twenty-eight inches, which, however, soon deepens to from thirty-six to forty inches, which is a circumstance much in favor of the above system.

Lattice Girders and Solid Plates.

The English magazines have of late been devoting much space to a discussion of the relative merits of solid plates and lattice girders, and though the question is certainly an important one, entailing, as it does, almost a revolution in the methods of construction, in case lattice girders possess all the advantages their advocates claim, yet the topic is still discussed, and the solution of this problem in mechanics seems nearly as far off as ever.

Those who rank among the more modern class of thinkers, who first theorize and then demonstrate, claim that the lattice will, for the same amount of material, sustain greater strains and endure shocks much better than a homogeneous plate, and the argument sustaining this claim is based chiefly upon the fact that iron will resist a greater force, applied in the direction of its fibers, than when across them, and it is claimed that mathematical analysis will render possible such an arrangement of the parts of the lattice that all, or nearly all, the strain will be in the direction of the grain or fiber of the iron.

Now, if we admit, what we certainly cannot prove to be false, that the engineer can, from pure theory and by the aid of mathematics, so place and arrange the parts of a girder that the strains will be in the direction of the fiber, and proportionate to the size of the pieces, we can draw a strong comparison in favor of open or lattice work.

No scientific man will deny the fact that a wire rope is both lighter and stronger than an iron rod of the same diameter or, if he claim the privilege of comparing the actual sectional area, taking the sum of the sectional areas of the individual wires, we can still claim greater strength for the rope upon the ground of more perfect structure, as proved by experiment—the weight, of course, being the same, or nearly the same, in either case. English bar-iron will resist about sixty thousand pounds tensile strain to the square inch, before parting, while wrought iron will resist over one hundred thousand pounds for the same actual area. Now, compare the lattice and plate in the same way. The plate corresponds to the solid bar and the lattice to the wire rope, and the openings to the space between the wire. Here we have undoubtedly so placed the direction of the strain that it is all with the fibers, and find that we have the proportion of ten to six in favor of the structure composed of several separate pieces.

Now, though this is perhaps an extreme case, and the argument only one by analogy, yet, while, perhaps, the same proportions would not exist between the degrees of resistance afforded by lattice girders and solid iron plates, as between the different qualities of iron, yet, from the superiority of construction obtained in the former, the reasoning will apply most forcibly. It will probably not be denied that the superiority of construction claimed really does exist, and this one argument is, therefore, taken alone, convincing.

But, after all, the matter of the relative strength of the material in different cases is really of less importance than is the apparently simple problem of fastening the parts together. If, after being properly arranged, the parts of the lattice can be so fastened together that each piece will do its entire duty without unduly straining its neighbor, there can exist no doubt that the lattice will be stronger than the iron plate girder, with its present form and arrangement; but, on the contrary, could the plate be placed in such a way as to be of equal strength at all points, without increasing the weight of the structure, the iron plate would certainly rival the weak forms of lattice as now constructed. Upon the ground, that this perfect construction cannot be obtained in a solid plate, the advocates of the lattice girders rest their claim, and it would seem that their assertions cannot, as regards this point, be readily controverted.—*American Builder.*

Science and Labor.

Dr. Lyon Playfair, M. P., the new president of the Midland Institute, Birmingham, in succession to the late Mr. Charles Dickens—to whose merits as a man of noble sympathies and beliefs, and an effective social reformer he paid a feeling tribute—opened the session by an eloquent and thoughtful address on the union of science and labor. Ridiculing the idea that advances in science had been the result of accident, he pointed out that man's wants had led to the industrial arts, and the practice of these and long-continued experiences gave

birth to science. It was not promoted by a leisured aristocracy, but, as a rule, by men rising from the industrial classes. Stephenson was a collier, Davy and Dalton druggists, Faraday a bookbinder, Harrison a carpenter, Watt a philosophical instrument maker, and Arkwright a barber. Even statesmen, such as Cobden, Bright, and Gladstone, were being drawn from the same ranks. In a graphic sketch of the development of arts, Dr. Playfair showed how much science had contributed to their progress, and concluded by urging the vital necessity of education, that knowledge and labor might be joined. In a well-educated community, he observed, deaths by violence should be impossible, and yet in the last five years 82,853 persons perished by violence in England and Wales, and through disobedience to sanitary laws 110,000 were sacrificed every year.

Cutting Carnelians, Agates, Etc.

Carnelian is the substance that has been selected as the example of the mode of cutting and polishing stones of a medium degeee of hardness, the two other examples being alabaster for the softest stones, and sapphire for the hardest, excepting alone the diamond, which last is worked in a manner peculiar to itself, and is separately considered.

Carnelian, when operated upon by the lapidary, is first slit with the thin iron slicer, fed with diamond dust, and moistened with brick oil; secondly, it is rough ground on the lead mill, with coarse emery and water; and thirdly, it is smoothed either on the same lap rubbed down fine, or with a similar lap used with finer emery; thus far, the steps are precisely as explained with regard to alabaster.

Carnelian, and stones of similar or superior hardness, which are not smaller than about one third of an inch in diameter, are in almost all cases polished on a lead mill plentifully supplied with rotten stone and water; but this fine powder will scarcely adhere after the manner of the coarser and granular emery, or by simple pressure; and therefore, to expedite the process, the face of the polishing lap is *hacked*, or *jarred*, although in a manner quite different from that pursued by the cutler.

The lapidary employs the blade of an old table-knife, which he holds slenderly between the thumb and finger, placed near the middle of the blade, while the front part of the edge rests on the lap, not perpendicularly, but slanted a little forwards, so as to meet the lap edge foremost during its revolution. The unstable position of the knife causes it to jump, vibrate, or chatter on the lap, and at each jump it makes a very slight furrow; these fill the face of the mill with minute lines, or grooves, that serve for the lodgment of the finely powdered rotten stone. It is, however, to be observed that the wheel should be first made to revolve in the one direction and then in the opposite, that the marks of the hacking-knife may cross each other.

Smaller and harder stones are more commonly polished on a pewter than a lead lap, and for the smallest and hardest stones a copper lap is preferred; but all the polishing tools, of what metal soever they may be made, are hacked as above described, and used with rotten stone and water.

Rounded or convex stones, or those said to be cut *en cabochon*, whether of carnelian, or even several of the harder stones, are in many cases successively wrought by means of the wood mill with fine emery, the list mill with pumice-stone, and leather lap with putty powder. This is done on account of the greater elasticity of these apparatuses, which enables them to ply more conveniently to the globular forms of the works to be polished, and avoid wearing them in ridges or flat places.

Faceted works, on all stones and hard substances, are for the most part cut by the lapidary after one of three different modes. First, for pastes, or artificial stones, and many soft stones, as amber, carnelian jet, etc., the facets are usually cut on a lead wheel with emery, and polished on pewter with rotten stone. Secondly, for some of a harder kind, but inferior in hardness to sapphires, the succession of tools is a pewter lap and fine emery for the cutting, and a copper lap with rotten stone for the polishing. Thirdly, for sapphires, the chrysoberyl, and rarely for some few others likewise, a copper lap with diamond powder is used for cutting the facets, and a copper lap with rotten stone for polishing them. And fourthly, with the diamond, two stones are rubbed in a peculiar manner the one against the other to cut the facets, and they are polished by means of the *drop*, and an *iron* lap, or *skive*, fed with diamond powder.

From the comparatively small size of the stones and gems that are cut into facets, they cannot generally be held unassistedly in the fingers; the stone is consequently cemented centrally upon the end of a round stick of wood, nearly like a drawing pencil. The stick, when held *vertically*, gives the position for grinding the central facet or *table* of the stone; the stick is inclined to a certain angle for the eight, twelve, or more facets, contiguous to the table; of which facets, two, three, or four series are commonly required at different inclinations; and, lastly, the *horizontal* position of the stick serves in cutting the girdle or central band around the exterior edge of the stones.

The several inclinations of the stick on which the stone is cemented, are easily determined by placing the upper end of the stick into one of several holes in a vertical post, fixed alongside the lap, and this retains the inclination very accurately and simply.

The following substances are worked by the lapidary in nearly or exactly the same manner as carnelian; and descriptive articles are introduced in the catalogue, upon each of these particular substances, pointing out their principal external features, and also any peculiarities of method pursued either by the lapidary or other artisan, as the case may be, in working them.

Substances treated by the lapidary like carnelian:—Agate, amethyst, aquamarine, beryl, blood-stone, Brazilian topaz, carbuncle, cat's-eye, chalcedony, chrysolite, chrysoprase, crystal, elvans, emerald, feldspar, flint, fluor-spar, garnet, granite, heliotrope, jade, jasper, lapis-lazuli, marble, mina nova, onyx, opal, pastes, peridot, plasma, porphyry, quartz, sard, sardonyx, serpentine, topazes.—*Handbook for the Artisan, Mechanic, and Engineer.*

IMPROVED ELEVATOR.

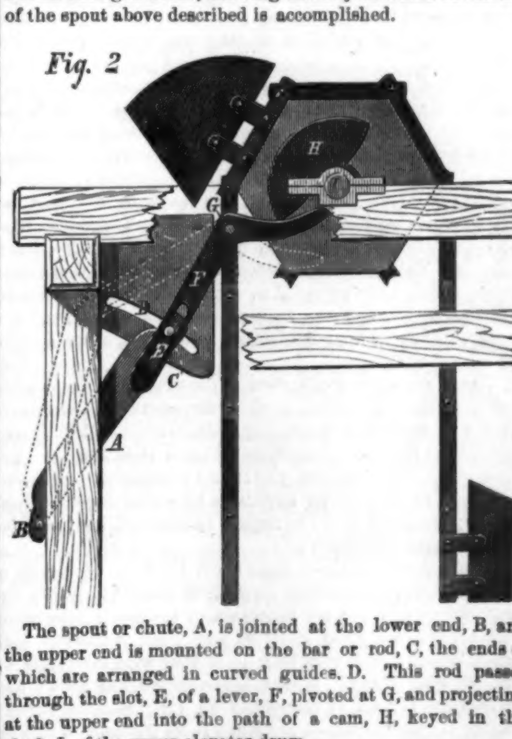
Our engraving illustrates a new method of constructing elevators for the use of mills, store-houses for grain, etc., and one for which it is claimed that it is particularly adapted to use in mines.

Fig 1

The improvement consists in arranging the spout or chute into which the substances elevated are dumped, so that the upper end will swing back under the bucket, thus insuring the receiving of all the contents of the bucket; and so also that it will, after receiving the contents of the bucket, swing out of the way, and not obstruct the downward motion of the bucket.

Fig. 1 is a perspective view of this improvement, and Fig. 2 is an enlarged detail, showing the way in which the motion of the spout above described is accomplished.

Fig. 2



The spout or chute, A, is jointed at the lower end, B, and the upper end is mounted on the bar or rod, C, the ends of which are arranged in curved guides, D. This rod passes through the slot, E, of a lever, F, pivoted at G, and projecting at the upper end into the path of a cam, H, keyed in the shaft, I, of the upper elevator drum.

The gravity of the spout, A, rod, C, and the lever, F, causes the spout to fall back at the upper end, under the buckets, so as to receive all the contents thereof, and the cam, H, is so arranged that just previous to the arrival of the bucket in the downward movement to the upper end of the spout, it will strike the upper end of the lever, F, and throw the spout up out of the way of the bucket. In this case, the buckets are so placed on the chain that one will pass over with each revolution of the cam; but it is evident that if more are applied, more cams may also be used to throw up the spout as often as a bucket passes.

This arrangement is claimed to save the loss due to the falling back of a part of the contents of the buckets, when the spouts are arranged in the ordinary way. It thus effects a saving in the power and time expended in elevating grain or any other material usually raised by such machines.

The inventor informs us that this elevator has been put to practical test for nearly two years in a coal mine, and that its operation has proved very satisfactory.

Patented, through the Scientific American Patent Agency, Sept. 27, 1870, by Theo. F. Rudiger, whom address for further information at Lawrence City, Kansas.

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

The Monitor Life Boat.

MESSRS. EDITORS:—I hand you herewith an account of some valuable experiments made at Nantucket with a Monitor or Perry Raft, similar to the one which went to England in 1867, but of smaller size, having but two cylinders. In these days, when ships go down with nearly all hands, like the "Captain," and the "Oneida," it is well to call attention to all good vehicles for saving life and property.

The experiments made have fully established the utility of the raft as a surf-boat, and especially for a conveyance for passengers from a stranded vessel; and the trial of Friday, Sept. 23, must have satisfied the most skeptical that the raft is also a very valuable auxiliary for wrecking purposes. Although the surf was not heavy nor the wind strong, there was enough of both to show that no surf-boat could do what was done with perfect facility by the raft. By the help of a small derrick, easily carried by two men and an ordinary tackle, the crew of seven men placed an anchor weighing 1,036 pounds, without including the stock, which must have weighed at the least 200 pounds, on the stern or shore end, and by the help of a few of the spectators it was shoved off and the crew hauled it off by a whale line previously sent off with a small anchor. As no one doubted the facility of dropping the anchor and weighing it again so as to bring it near to the beach, that part of the process was omitted, and the anchor was landed again on the raft, the derrick lifting it off with great facility. After thus fully satisfying all present of the utility of the raft for carrying out an anchor, and for landing cargo of considerable weight and bulk, the crew, under the able management of Capt. J. A. Brown, of Barnegat, pulled to the westward, where the breakers ran in quite sharp, and performed various evolutions, such as turning short round on the very verge of the beach and on the breakers, pulling along shore in the trough of the rollers, and once, backing in until the steering oar could touch the shore, she was pulled off easily. In short, nothing could be more satisfactory. The crew, composed of experienced surf-men, one and all assured me that she could be got off when any boat could go, could be turned quicker, and that no boat on the island could have taken off the anchor on that occasion; all of which I was fully convinced of before, but it was very satisfactory to find my theory fully confirmed by the experienced seaman of Nantucket. Capt. Folger, agent for certain underwriters who own surf boats and wrecking appliances, said that he hoped I would condemn the raft for humane purposes in order that he might have it for wrecking.

I have only to add that I have no interest in the raft beyond that of calling the attention of all humane societies and all wreckers, all steamship and steamboat owners, all interested in vessels of war and passenger ships, to the great value of it for many purposes, involving the saving of life and property. It is not necessary to look back a great many years, in order to call to mind the terrible loss of life on the ocean for want of some such vehicle as the Monitor Raft. Take for an example the recent loss of the Captain with nearly five hundred souls. If she had been furnished with three Monitor Rafts of three cylinders each, ready on the hurricane deck, nearly all would have been saved. Not a year passes without great loss of life on our rivers and lakes, for want of some such thing as a Monitor Raft.

Boston, Oct. 17th, 1870. R. B. FORBES.

"Buzzing Up," Again.

MESSRS. EDITORS:—Your correspondent, L. U. Chapin, seems to be bothered to get the hang of this curious experiment, which is as easy as *flying*, when you once know how. Our way of doing the business when I was a Litchfield-county boy, was to place the buzzee extended, head and heels on two chairs. Then four of us buzzers, standing two on each side of him, placed our fore-fingers under shoulders, hips, thighs, and calves, bending so as to bring our heads over the center of the extended body. Then all (including buzzee) breathed three long, deeply inhaled and exhaled breaths in unison, and as the last breath was *going out*, all "willed," and lifted—what?—a feather's weight!

If the breathing was done simultaneously, and the "vacuum" (as we thought) well formed, up flew the buzzee, "as light as a cork," and was often held on the tips of our fingers, as high as the arms could reach, for an appreciable space of time. If successful, Dame Nature's gravity was in a bad way; if we failed (and, *i' faith*, there was "no such word as fail") ours was upset, which made quite as much fun and rather increased our wonder.

Stockbridge, Mass. I. IVES PEASE.

Rubber Boot Soles.

MESSRS. EDITORS:—In the SCIENTIFIC AMERICAN of the 8th of October, N. A. H., of Cal., asks "how to put rubber on

the soles of boots." Some years ago I applied soles to a number of pairs of boots that wore entirely out without the rubber separating at any point.

Get some dissolved rubber; scrape the sole clean, and coat it with the dissolved rubber, and set it away to dry; the next day add another coat of rubber, and continue so to add until the rubber will remain on the surface like varnish. It will take three or four coats. In the meantime scrape or sandpaper the rubber sole, and give that one coat of the dissolved rubber, and allow it to stand a day or two; now give the sole of the boot a good coat and apply the rubber, having both sole and boot blood warm. Work the air all out with a round stick, in the same way that shoemakers finish the bottoms of boots.

M. W.

Electrolytic Insulation.

MESSRS. EDITORS:—In your valuable paper, of Oct. 22, I read an article about electrolytic insulation, which said that "wires may be insulated from each other, under any given electromotive force by means of good conductors of electricity so arranged as to generate an electromotive force, which opposes the escape of the current, when the latter is transmitted in a particular direction;" or in other words, the wire is so situated between metals and electrolytes, that the difference of electric tension of the wire (or of the telegraph wire and the earth) is constant.

As I understand telegraphing, the transmitting of signals consists in making the telegraph wire alternative electric and non-electric, or, in other words, introduce a current and interrupt it again.

How can the wire, insulated as described, be rendered non-electric, as in its entire length this electrolytic insulation restores every instant the electric difference?

If the one end of the wire is connected with a battery, the other end will indicate a galvanic current, but when the battery at the one end is excluded, the current on the other end will not cease as the "electrolytic insulation" now entirely compensates the excluded battery on the other end, and the current will continue in spite of all attempts made on the one end to stop it. I wonder how electrical signals can be transmitted through such a telegraphic line.

Therefore, I think, it is quite impossible that, in the future history of this science-art, electrolytic insulation may be made to render good services.

The above is only my prejudicial opinion, and I would like to hear through your valuable paper, whether it agrees with the opinion of scientific men or not.

Philadelphia, Pa. HUGO BILGRAM.

"A Cheap and Efficient Low Water Detector."

MESSRS. EDITORS:—In a late issue of your paper, "Safety" informs the public how to apply a plug of common tinmen's solder, to indicate, when it melts, a low stage of water in the boiler. The use of such plugs is neither safe nor efficient. In the use of certain waters a scale will form over plugs exposed to the direct action of the water, and render them not only useless but dangerous, if relied upon as indicators of low water. Then again the melting of such a plug puts the fire out, and stops the works. Is this cheap? Would "Safety" recommend the use of such plugs in boilers of steamboats?

Boston, Mass. B. FRANKLIN.

[For the Scientific American.]

AUTOMATIC TELEGRAPHY.

BY GEORGE B. PRESCOTT

Ever since the introduction of the electric telegraph as a means of communicating intelligence rapidly, efforts have been made, both in this country and in Europe, to perfect a system of automatic telegraphy by which the number of dispatches transmitted over each wire could be increased. Even in the early days of the electric telegraph, Professor Morse sought to perfect this system, which was embodied in the first telegraphic instrument devised by him in 1832, as it was also in the first model by which the new art was demonstrated in 1835. At that early period the automatic was deemed to be the only practical, if not practicable, method of insuring a perfect record. The details of this process are to be found in the earliest specifications and descriptions of the Morse invention in the Patent Office at Washington, and the instrumentalities are very fully described and illustrated by diagrams in Vail's earliest work on the telegraph, published in 1845. In this system metallic types were employed, which formed the dots and dashes of the Morse alphabet by short or long projections. These types, arranged or set up as a message, were placed in a row in rules or composing sticks, and were carried by clock-work mechanism under a lever which opened and closed an electric circuit, in accordance with the projections or depressions of the types. Experience soon suggested, however, that manipulation by hand with a simple lever possesses the advantages of greater simplicity and economy, and it was the system adopted for practical use.

In 1848, Alexander Bain, of Edinburgh, endeavored to solve the problem of automatic telegraphy in a different manner. He prepared the messages by a hand punch, which cut longer or shorter rectangular holes in a paper band; and these holes reproduced the Morse characters by electro-chemical means, when they were drawn underneath a rubbing contact pressing on the paper. This plan also had no practical result, for on the one hand the preparation of the perforated paper band was too troublesome and slow—the time occupied in preparing the messages for transmission being many times greater than that required for sending by the Morse system—and on the other hand, the signals could not be legibly recorded, when transmitted rapidly over long lines, in consequence of the disturbing effects of static charge.

In 1854, Messrs. Siemens and Halske, of Berlin, endeavored to remedy the defects of Bain's apparatus by means of a punching apparatus constructed with three keys. The first key, when pressed down, punched a single hole in the paper band; the second, a double hole; while each key, on returning to its normal position, pushed the paper the necessary space forwards; the third key did not punch, but served only to produce spaces between letters and words. This system was introduced on the Warsaw & St. Petersburgh line, but did not long remain in use, for the preparation of the paper was still found to be inconvenient and expensive, and a very carefully and frequently adjusted relay arrangement was required for the production of good work.

In 1857, Mr. John P. Humaston, of Connecticut, invented an instrument for perforating the paper to be employed in the transmission of messages upon the Bain plan, which it was thought by some would bring the automatic system into general use; but this apparatus, although very ingenious in design, was found too complicated, as well as too slow, for practical use—its capacity for producing the Morse characters, when worked by an expert operator, being only about one third as great as that of the ordinary hand key.

In 1858, Professor Wheatstone took out a patent in England for an automatic telegraph. He employed Bain's punched paper band and a three-keyed puncher, modified by employing double holes for representing the dash of the Morse alphabet, not next to one another, but over and under a middle row of holes. This third line of holes was produced by a special third punch which came into action on the depression of each of the three keys.

For sending messages, Wheatstone employed a peculiar and very ingenious apparatus set in motion by the turning of a handle. It was provided with three needles lying in a vertical plane, and held up by light springs. These needles were elevated and pressed against the paper by the turning of the handle. The middle needle, in rising, always met a hole and passed through it, while the two side needles were held back by the paper, when there happened to be no hole immediately above them. The pieces carrying the side needles made battery contacts when the latter went through the paper band, while the middle needle was carried forward by a mechanical arrangement, and thereby advanced the paper a space corresponding to the distance between two of the center holes. Wheatstone at first used currents in one direction, but at a later date he employed alternate currents and polarized electro-magnets. His apparatus suffers, however, independently of technical defects, from the slowness and difficulty of preparing the messages by means of the three-keyed puncher.

In 1862, Dr. Siemens, of Berlin, again endeavored to solve the problem of successfully operating an autographic telegraph by the method first introduced by Professor Morse, employing for this purpose an electro-magnetic type transmitter, which, it is said, enabled messages to be sent with tolerable certainty over short lines with about seven times the speed of hand sending. The instrument required, however, to be worked with more than ordinary care to secure accurate results; and it was also found that the setting up of the type took too much time, and required too numerous a staff of operators to compete successfully with the hand systems.

Dr. Siemens subsequently went back to the employment of Bain's paper band, the endeavor to construct a machine for the rapid setting and distribution of metallic types having been attended with less success than he had anticipated; but he has not yet succeeded in making the system practically useful.

In 1869, Mr. George Little, of New Jersey, patented an apparatus for preparing messages for transmission by Bain's automatic system, and a wire has recently been put up between New York and Washington for the purpose of testing the value of the apparatus. The same difficulty, however, appears to be encountered by this as with all previous attempts to utilize automatic telegraphy—too much time and expense are required to prepare dispatches for transmission. This apparatus, instead of being an advance upon those which have preceded it, seems to be among the least efficient of all, and the success of automatic telegraphy is apparently as far from realization to-day as it was a quarter of a century ago.

The theory upon which most of the experimenters in automatic telegraphy have apparently proceeded is that electricity has a definite and practically instantaneous velocity, irrespective of the medium through which it is transmitted, and that all that was necessary to insure the success of the system was to provide an apparatus by which dispatches previously prepared could be rapidly transmitted and recorded by automatic machinery.

Experiments conducted upon short lines, or upon coils of wire intended to represent long lines, seemed to justify the conclusions to which the advocates of automatic telegraphy had arrived, but when attempts were made to transmit with great rapidity upon very long lines they were invariably attended with failure. Recent investigation has shown that electricity instead of possessing an instantaneous velocity under all circumstances, is limited in its movements like all other forces in nature; and that its speed depends upon certain absolute conditions, among the principal of which are the length, size, and quality of the conductor through which it is transmitted.

In a recent series of carefully conducted experiments with the automatic system in which chemically-prepared paper of a very sensitive nature was employed, I found that the highest rate of speed attainable through 500 miles of No. 8 iron wire did not exceed the ordinary rate of transmission by the Morse apparatus; and that the greatest speed which could be attained over a telegraph line of 250 miles in length composed of No. 8 iron wire was 100 words per minute. When the speed of the instrument was increased beyond this rate the signals were prolonged so as to run into each other and become unintelligible.

The speed of transmission increases with the square of the diameter of the wire, and diminishes with the square of its length. If a wire of the above length, but of a superior conductive capacity were employed, a proportionate increase in the rate of speed would be obtained. Thus, for example, on the compound steel and copper wire just put up between New York and Washington, which has a conductive capacity equal to a No. 5 iron wire, or about double that of a No. 9 iron wire, intelligible signals have been transmitted at the rate of 250 words per minute. By proportionately increasing, therefore, the conductive capacity of the wire, almost any degree of rapidity may be attained in the transmission of signals; but instantaneous velocity can only be attained by a conductor of infinite dimensions.

Supposing the claim was true, however, that there is no limit to the rate of speed at which dispatches can be transmitted by the automatic system over any of the lines now in use, what would be gained by its adoption? The value of the telegraph consists in its ability to furnish constant and instantaneous communication between all places in an accurate and reliable manner, and as the present systems are fully competent to meet all of these requirements, why is a change necessary or desirable? The fact that a much greater amount of matter may be transmitted in a given time, over the same number of wires, by the automatic than by the present system, offers in itself no conclusive argument in favor of a change, since there is no limit to the number of wires which may be strung between any two points in order to meet any possible increase in the traffic. The only reason, therefore, which can be adduced in favor of substituting the automatic for the hand systems is that a given amount of business may be transmitted by it at a saving in the cost of construction and maintenance of line. The superiority of the automatic system then, if it has any, consists in its greater economy. Let us see whether it is entitled to this credit.

If the expense of constructing and maintaining a sufficient number of wires to transmit a certain amount of telegraphic correspondence was the only essential element to be considered in estimating the cost of the service, then, of course, that system which could perform the service upon the smallest number of wires would be found the most economical in practice; but, unfortunately, the expense of constructing and maintaining the lines, although large, is not the greatest item in the expense of operating a telegraph, the annual expenditure for operators and clerks considerably exceeding it; and the problem, therefore, as to which system is the more economical cannot be properly solved, unless all the items of expenditure involved in the transmission of a dispatch are duly considered.

In transmitting messages by the systems now in use, no previous preparation of the dispatches is required. The copy as it is written by the customer, is placed upon the operator's table and transmitted by the Phelps printing instrument at from 2,500 to 3,000 words per hour, and simultaneously printed in plain Roman letters at the receiving station ready for delivery.

The automatic system, on the contrary, requires that the messages be previously prepared for transmission, either by a perforation of the characters representing the contents of the dispatches through a band of paper, or by setting them up in forms from movable metallic types; and after they have been thus prepared and transmitted, the record which is made at the receiving station in telegraphic characters or signals, must be subsequently translated and legibly copied upon suitable blanks before they are ready for delivery. All of this process, of course, requires time; and time is what the telegraph is especially designed to annihilate.

The best speed yet obtained during an entire day in preparing messages for transmission has never exceeded six hundred words per hour by any automatic apparatus ever devised; and as the average rate of transmission by the Phelps letter printing instrument, which is employed by the Western Union Telegraph Company between some of the principal commercial cities, is twenty-five hundred words per hour, it is evident that it would require four operators, at least, to prepare as much matter for transmission by the automatic apparatus, as one operator can send by the Phelps printing instrument; and as the messages will require translation as well as copying at the receiving station, at least as many operators would be required for this service as for the preparation of the messages, and in addition to these, one operator would be needed at each office to work the transmitting and receiving apparatus, so that no less than ten operators would be necessary to transmit as many messages per day by the automatic system as are now sent and received by two Phelps printing operators in the same time.

It is claimed by some of the advocates of automatic telegraphy that, although it requires a much larger number of persons to perform the same amount of work by that system, still as a less expensive kind of labor may be employed, the aggregate expense of each would still be in its favor; but this claim, I apprehend, is not well founded. It requires a certain amount of education and intelligence to operate any kind of a telegraphic apparatus, and, generally speaking, about as much to work one kind as another. Now, I do not doubt that girls and boys of ten or twelve years of age may be found who can prepare messages for transmission by the automatic system—as is claimed by the promoters of that enterprise—but the same prodigies could learn equally well to operate the other systems; but that all girls or boys of that age, or any considerable proportion of them, are qualified

to do either, is very improbable; and I scarcely think that any argument is necessary to convince a reasonably intelligent person that the telegraphic traffic of this country cannot be safely intrusted to, nor satisfactorily performed by, children of any age, however precocious they may be.

The operators employed to prepare messages for transmission by the automatic system must at least be qualified to read ordinary manuscript writing, else they could not render the messages handed in for transmission by the public into the telegraphic characters; while those who are employed to copy the messages after they have been transmitted must be competent to write a legible hand; and this is all the education necessary to learn any other system of telegraphy. In practice, therefore, the automatic operators would require to be just as competent, and would be entitled to receive as much pay for their labor, as those of any other system. In order, however, to present the automatic system in the most favorable light possible, and to give it every advantage which its promoters claim for it, however improbable, I have in the following estimates put the rate of compensation for the services of a printing operator at one hundred per cent above that of an automatic operator.

The cost of building a telegraph line depends, like that of any other structure, upon the value of the materials and labor employed in its construction, and differs materially in various sections of the country. But assuming that a telegraph line, with a single wire, may be built in this vicinity for three hundred dollars per mile, and additional wires put up on the same poles at one hundred dollars per mile, the following tables will show the cost of constructing and maintaining a line of telegraph between New York and Washington, together with the expense of the operators required for the transmission of a given amount of business by the automatic and the Phelps printing systems of telegraphy:

COST OF A TELEGRAPH LINE BETWEEN NEW YORK AND WASHINGTON.

1 wire, 228 miles, at $300 per mile	$ 68,400
2 wires, " " 400 "	91,200
3 " " " 500 "	114,000
4 " " " 600 "	136,000
5 " " " 700 "	157,000

STATEMENT, SHOWING THE COMPARATIVE ECONOMY OF EMPLOYING THE AUTOMATIC AND PHELPS PRINTING TELEGRAPHS, UNDER THE SUPPOSITION THAT THE AUTOMATIC CAN TRANSMIT AS MUCH MATTER IN THE SAME TIME UPON ONE WIRE, AS THE PHELPS INSTRUMENT CAN SEND UPON TWO, THREE, FOUR, OR FIVE WIRES.

PHELPS' PRINTING SYSTEM.

TWO WIRES.

Interest on cost of line, $91,200 at 7 per cent	$ 6,384
Maintenance of line at 3 per cent on cost	2,736
Battery	236
Four operators at $1,200 per annum	4,800
Four grinders at $500 "	2,000
Expense per annum	$16,156

AUTOMATIC SYSTEM.

ONE WIRE.

Interest on cost of line, $68,400 at 7 per cent	$ 4,788
Maintenance of line at 3 per cent on cost	2,052
Battery	118
Ten operators to prepare messages for transmission at $600	6,000
Two operators to transmit and receive at $600	1,200
Ten operators to translate and copy at $600	6,000
Expense per annum	$20,158

PHELPS' PRINTING SYSTEM.

THREE WIRES.

Interest on cost of line, $114,000, at 7 per cent	$ 7,980
Maintenance of line per annum at 3 per cent	3,420
Battery	354
Six operators at $1,200 per annum	7,200
Six grinders at $500 per annum	3,000
Expense per annum	$21,954

AUTOMATIC SYSTEM.

ONE WIRE.

Interest on cost of line, $68,400 at 7 per cent	$ 4,788
Maintenance of line per annum at 3 per cent	2,052
Battery	118
Fifteen operators to prepare messages at $600	9,000
Two operators to transmit and receive at $600	1,200
Fifteen operators to translate and copy	9,000
Expense per annum	$26,158

PHELPS' PRINTING SYSTEM.

FOUR WIRES.

Interest on cost of line, $136,000 at 7 per cent	$ 9,520
Maintenance of line at 3 per cent on cost	4,080
Battery per annum	472
Eight operators at $1,200 per annum	9,600
Eight grinders at $500 per annum	4,000
Expense per annum	$27,672

AUTOMATIC SYSTEM.

ONE WIRE.

Interest on cost of line, $68,400. at 7 per cent	$ 4,788
Maintenance of line per annum at 3 per cent	2,052
Battery per annum	118
Twenty operators to prepare messages at $600	12,000
Two operators to transmit and receive at $600	1,200
Twenty operators to translate and copy at $600	12,000
Expense per annum	$32,158

PHELPS' PRINTING SYSTEM.

FIVE WIRES.

Interest on cost of line, $137,000, at 7 per cent	$10,990
Maintenance of line at 3 per cent	4,710
Battery per annum	590
Ten operators at $12,000 per annum	12,000
Ten grinders at $500 per annum	5,000
Expense per annum	$33,290

AUTOMATIC SYSTEM.

ONE WIRE.

Interest on cost of line, $68,400, at 7 per cent	$ 4,788
Maintenance of line at 3 per cent on cost	2,052
Battery per annum	118
Twenty-five operators to prepare messages at $600	15,000
Two operators to transmit and receive at $600	1,200
Twenty-five operators to translate and copy at $600	15,000
Expense per annum	$38,158

The increase in the number of automatic operators is required to keep that system up to the working capacity of each additional Phelps wire.

Thus it will be seen that, even admitting the claim that there is no limit to the amount of matter which may be transmitted by the automatic system over a single wire to be true, and also allowing that operators may be employed to work it at one half the rate of compensation which is paid to the Phelps printing operators, there is still no economy in its use, since the extra labor required in the preparation of the dispatches for transmission, as well as in the subsequent translation and copying, far exceeds the gain in the cost of constructing and maintaining the wires; and a thorough and impartial examination of the subject shows that the more the automatic system can be shown to exceed the present system in the amount of matter which can be transmitted by it, the greater would be the loss incurred in its operation; thus establishing the singular paradox that when most successful it is the greatest failure.

In the preceding exhibit, I have given the automatic system the benefit of a higher rate of speed than has ever been practically attained in the preparation of messages for transmission, while messages have been transmitted by the Phelps instrument at over 3,300 words per hour. It cannot, therefore, be justly claimed that I have failed in any respect to make as favorable a showing for the automatic system as the case will admit of, while, on the contrary, I have conceded a good many advantages to which it is not entitled.

In order to attain the exceptionally high rate of speed which has been experimentally obtained upon the automatic line recently constructed between New York and Washington, the new company put up a steel and copper wire for which they paid more than three times the cost of a good iron wire suitable for the use of the systems in general use. It is evident, therefore, that even the claim for greater economy in the construction of their lines, which has been so frequently made by the advocates of that system, is not well founded.

But, leaving all other considerations out of the question, the automatic system fails in the first two great and indispensable requisites of a telegraph—continuous and instantaneous communication. Before a message can be prepared for transmission by the automatic process, it can be transmitted, copied, and placed in the messenger's hands for delivery by either of the systems now employed. No matter how good a telegraphic apparatus may be in other respects, if it fails to transmit messages promptly it is comparatively useless. The public does not care to know how many dispatches can be sent in an hour over one wire, after half a day has been consumed in preparing them for transmission. Instant and constant dispatch is what is required, and that system only will be employed which can effect it. These most essential elements of success in telegraphy are totally lacking in the automatic system, and it must, therefore, hereafter, as heretofore, prove an absolute failure for all practical purposes.

[For the Scientific American.]

THE SEA URCHIN.

BY J. B. GORDON.

The Echinus, or Sea Urchin, as it is commonly called, is a subject of the division Radiata, and class Echinodermata. It consists of a molluscous animal inclosed in a casing of a limy substance, resembling the shell of a hen's egg, but considerably thicker; hence, it has received the vulgar term of sea-egg, when deprived of a number of radiate spines with which the exterior is provided. The spines proceed from the shell in all directions, and taper, thus forming a number of points, and giving it a formidable appearance. These spines are jagged, and if allowed to penetrate the flesh of any animal, are withdrawn only by leaving portions rankling in the wounds made thereby, as they are very brittle. The sea-egg or limy case of the Echinus, on being dissected, presents a number of triangular and hexagonal plates. It is of a spherical form when integrate, considerably flattened, resembling in shape a portion of dough when prepared for the well-known American accompaniment to a breakfast table, biscuits. It is studded with a number of small, pearl-like protuberances. Sea-eggs are found varying in size from less than an inch, to above four inches in diameter, greatest measurement. The spines are in length proportionately from one to six inches, and are about as thick as an ordinary round bodkin.

The Echinus is found in tropical waters in profusion, where numbers may be observed rolling sluggishly along the bottom of the sea, upon the tips of their spines; partly propelled by their will, partly by the surge of the water. Upon being procured from the sea, they present a dingy appearance. There are two or three species, the most common are the black and the white; but when first taken from their ocean home, it is hardly possible to distinguish them except by the shortness of the spines of the white kind, for the latter are nearly as black as the former. After bleaching, however, the difference is perceptible in the shell, as the former retain an olive brown tinge, while the latter are perfectly white or assume a pink tinge. There is a slimy coating over the shell of the egg when procured from the water; this dries and falls off as do also the spines. Beneath each egg, there is a large opening in which is placed the mouth, and which is provided with a number of small teeth all converging towards their points. On the top of the egg, there is a small hole, large enough to admit a duck-shot. The entire case is porous, as may be seen when it is held up to the light.

The Echinus has been employed in many ways. The French and Spaniards prepare delicious dishes from it. The shells serve as ornaments on "what-nots," or they are arranged pyramidically in the conchologists' cabinets. Pin-cushions for ladies toilets, emery bags for their work-tables, and needle-cases for their work-boxes, can be made of them. The manner of preparing the eggs for these purposes is as follows: The eggs are procured, not by a drag-net or shell dredge, that would destroy them, but by a person who wades into the sea till about the middle of his waist in the water, where he finds them in regular reefs skirting the shore, and takes them up carefully with his hands. At stated times they are driven on shore in a perfect condition by the ocean's swell; then, they need not be sought in the depths of the sea, and besides it is preferable when they can thus be procured, as one is very apt to be severely pricked in attempting to lay hold of the black ones, even with the aid of two pieces of stick, the thorns of the white ones are, however, comparatively innocent, as they are so short. Next, they are placed in the sun on a white-plastered wall in a secluded spot. After several days' exposure to a scorching solar heat, the spines fall off, the shells begin to turn white, and this must be assisted by a daily wash with soap, brush, and cold water. The shell is allowed to dry thoroughly again, and the animal within further permitted to decompose, until it can be easily extracted by means of a piece of stick. When it is all ready for use, a quantity of saw-dust or emery, as the case may be, is procured and is inserted in a cushion within the egg. Thus we have a pin-cushion or emery cushion, according to the stuffing employed.

I have before asserted that the Echinus is found in numbers, skirting the shores. Woe to the unfortunate fellow who recklessly plunges into the sea, deeming himself free from harm! He rises cognizant of the fact that he has returned to the surface a little the worse of his fool-hardiness, and runs with all speed to the shore to sit in agony and extract, as best he can by means of his pocket-knife, such portions of the spines as have not sunk beneath his reach. To the native, not so unfortunate, there is a great consolation; for while the tyro is digging and cutting into the wound with his pen-knife; he, with less rapid pace, yet determined action, makes for his garments, which having donned, he proceeds to a friend's house and obtains a piece of tallow, lies flat on his stomach, turns the soles of his wounded feet up, and allows his friend to place a portion of the tallow on the wounds, while it is slightly cauterized with the flame of a lighted candle. A few hours transpire ere the points are extracted, but the pain is much alleviated by the process.

Once, I had frequently warned a stranger about his carelessness in bathing in the vicinity of a reef of the sea-urchin, but he heeded not my counsel until one day he came to me in intense agony, regretting that he had not taken my advice. After he had calmed a little, I told him that I would send a colored person who would render him immediate relief. After several excuses, he consented to undergo the process which I described to him; and, to his utmost satisfaction, he was all right again in a couple of hours after. He vowed that he would not bathe in a hurry again. I told him that he should have been more cautious, particularly as I had warned him of the danger.

Printing in the Chinese Language.

The editor of the New York *Observer* in "The Tour Around the World," gives the following description of the difficulties of book-making in China:

"One of the first places that I visited on reaching Shanghai, was the Mission Press of the Presbyterian Church of the United States—a wisely founded institution, which has been doing a great work. It is the most extensive printing establishment in China, and has been sending its light into Japan as well. The great work of Dr. Hepburn, of Yokohama—his quarto Japanese Dictionary—was printed at this press; and during the last year, the third edition, 2,400 copies, of another Japanese Dictionary, the first two editions of which were printed at Yeddo, has been printed. It is a type foundery as well as a printing house, and, with judicious and liberal management, it may be made an important engine for good in time to come as it has been in the past. During the year 1868, 25,000,000 pages were printed at this press; and in the present year the whole of the New Testament and of the Pilgrim's Progress has been admirably electrotyped. I have before me a copy of the Pilgrim's Progress in Chinese, illustrated with engravings drawn and executed there, and also a copy of the Peep of Day, in Chinese, from the same press.

"On entering this extensive printing establishment, I was confronted with a series of amphitheaters, in the interior of each of which stood a compositor; and I saw at a glance the immensity of the work which every one who learns to read or speak or print the Chinese language has to encounter. Each one of these amphitheatres was what printers call a case, containing, not twenty-six letters as in English printing offices, but more than six thousand different characters of types, and, with the combinations that are made, more than thirteen thousand. I do not much wonder that the Chinese adhere to their old method of engraving everything on wood that they print, for I should be very loth to attempt to hunt up many letters or words out of the six thousand boxes that I saw before me. And yet this mode of printing is a great improvement on the old."

Government Storm Signal Stations.

The following have been selected as the stations of observation and report, to be first occupied. The list will be improved as the facilities granted the office may permit:

Plaister Cove, N. S.; St. John, N. B.; Portland, Me.; Boston, Mass.; New Haven, Conn.; New York City, N. Y.; Philadelphia, Pa.; Baltimore, Md.; Washington, D. C.; Wilmington, N. C.; Charleston, S. C.; Augusta, Ga.; Savannah, Ga.; Lake City, Fla.; Key West, Fla.; Montgomery, Ala.; Mobile, Ala.; New Orleans, La.; Jackson, Miss.; Memphis, Tenn.; Nashville, Tenn.; Louisville, Ky.; Cincinnati, Ohio; Knoxville, Tenn.; Albany, N. Y.; Syracuse, N. Y.; Oswego, N. Y.; Rochester, N. Y.; Buffalo, N. Y.; Cleveland, Ohio; Toledo, Ohio; Detroit, Mich.; Chicago, Ill.; Indianapolis, Ind.; St. Louis, Mo.; Milwaukee, Wis.; St. Paul, Minn.; Duluth, Minn.; Omaha, Neb.; Cheyenne, Dak.; Corinne, Utah; Santa Fe, N. M.; Fort Benton, N. M.; San Francisco, Cal.

THICKNESS OF THE EARTH'S CRUST.—To enable the earth to resist the tide-generating force of the sun and moon, so as to leave the phenomena as they are actually found, Professor Thompson considers that its crust must have a thickness not less than two thousand or two thousand five hundred miles. Such a conclusion is of course quite inconsistent with the hypothesis that the earth is a mass of molten matter inclosed by a thin, solid shell.

Improved Treadle Motion or Foot Power.

Many devices calculated to relieve the monotony of motion, and thus divest the actuation of light machinery by the feet, of its wearisome and, in some cases, injurious character, have been from time to time devised, and some have met with considerable favor. Where the feet and lower limbs are chiefly involved in producing the motion, as is the case in sewing machines, the following requisites to a good treadle motion, may be enumerated:

The axis of oscillation should be placed directly under the ankle, that is, the foot pieces should be so placed that the shaft upon which they are fixed is directly under the ankle. This allows a quiet motion of the foot and calf, without moving the thighs, a thing which is impossible when the foot-pieces are placed in any other position. This avoids all excitement resulting from rubbing of the limbs, an evil which has been strongly condemned by physicians, as leading to disease and weakness, especially with females, by far the most numerous operatives on sewing machines. Isochronal movement of the feet, which has been recommended as a remedy for the evil specified, is open to the serious objection that it is far more wearisome than alternate motion. The irritation caused by devices employing alternate motion, is, we think, wholly the result of a faulty position of the pedals. If these be properly adjusted in accordance with the principle above enunciated, alternate is, in our opinion, much better than isochronal movement in devices of this class.

Our engraving shows a very simple method of obtaining continuous rotary motion with alternate motion of the pedals. There is no dead center common to both pedals, so that either one or the other will at any time start the machine. The machine may therefore be entirely controlled by the feet, and may be moved as slowly as desired, without danger of stoppage. The wheel may also be started from any point in its revolution.

The arrangement is so simple that we shall not need to refer to the parts, by letters of reference.

The left pedal is riveted to the shaft, while the right one plays freely on the same shaft. From the latter projects an arm, to the end of which is attached a pitman connecting it with the crank wrist. Another arm is keyed to the pedal shaft, at, or nearly at right angles with the other arm, and is connected by a pitman with the crank wrist, in the same way as the first.

This arrangement allows the feet to alternate in their movement and secures the advantages above named. The device can be used most advantageously in connection with a brake to prevent reverse motion.

Patented, August 30, 1870, by Geo. B. Safford, Burlington, Vt., whom address for further information.

SAFFORD'S IMPROVED TREADLE MOTION OR FOOT POWER.

Improved Miter Box.

Among the many and useful improvements that have been made in tools used by wood-working mechanics, we find few miter box improvements. The common miter box has many disadvantages to overcome which have been studied with no very decided success. To fit a miter box for general use as a tool, it should possess the attributes of simplicity, accuracy, durability, and cheapness. Mechanics cannot and will not use any device that is complicated, inaccurate in its workings, or expensive.

We give herewith an illustration of a recent improvement in miter boxes, that is claimed to overcome many of the objections heretofore met with in devices of this kind, with much saving of labor and accuracy in its working. It consists in an arrangement of adjustable stands and guides on a stationary bed, A, which may be made of either wood or metal, and of any desired length or breadth. To the opposite side edges of this bed are secured slotted cast metallic standards, B, which are made adjustable by means of the slot, C, and which work on the pivot, D. These standards have affixed to them strips of hard wood, between which the saw works in cutting miters, bevels, etc.

Fig 1

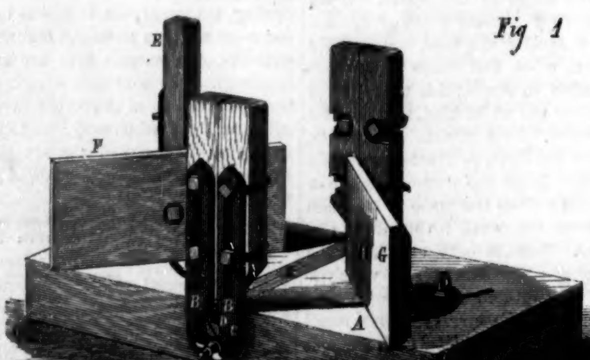
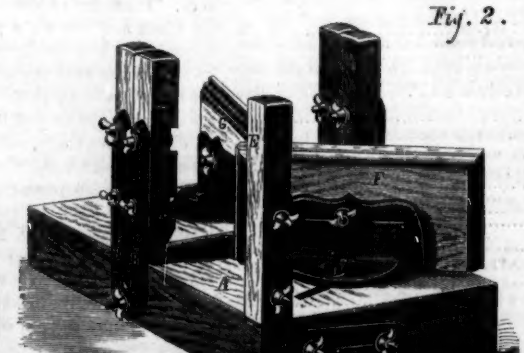


Fig. 2.



WILCOX'S MITER BOX.

E is an adjustable guide placed on the opposite left-hand corner from the work side of the box, and set at exactly right angles with the saw line. The purpose of this guide is to give a rest or guide for a piece like a casing for a window frame, when it is desired to cut it to the bevel of the sill.

Upon the top of the bed are placed two adjustable miter guides, F and G. These miter guides consist of castings having slots, to which are affixed woods, in such a manner that either of the guides may be placed at the saw line, or run back out of the way of the piece to be cut from the other guide. It will be seen that by setting the guides, F and G, on an exact miter with the saw line, H, and inclining in either direction the standards, B, a compound miter or bevel may be cut of any desired form.

I is the working side of the box. In working with this box, the saw, after having cut off a piece to any desired form, works down upon a strip of hard maple dovetailed across the bed. This strip can easily be taken out and replaced when it becomes worn. The strips of maple affixed to the standards, B, are adjustable to a saw of any thickness, and may be taken out, dressed up, and placed back again when necessary.

No parts of this box, except the saw guides and dovetail strip, are destructible by reason of wear. In traveling from one place to another, it can be taken apart and packed in a chest in as little space as a long-jointer would require.

This invention was patented, through the Scientific American Patent Agency, by Edward M. Wilcox, of Bloomer, Chippewa county, Wis., July 20, 1870. For further information apply to Wilcox & Pierce, No. 73 Dearborn street, Chicago, Ill.

Hand-made Cheese—A New Industry.

A German hand-cheese factory has been established in the southern section of Philadelphia, by Mende Brothers, which is now carried on with much success. The *Practical Farmer* says:

"It was to us an entirely new industry, illustrating what we have often had to remark, that if farmers would give their business more thought and study, it will be found to embrace many subdivisions, and much greater variety than the old stereotyped rotation of corn, oats, and wheat.

"The business which Mende Brothers have established is that of purchasing from the farmers of Chester and Delaware, Bucks and Montgomery counties, curdled milk, commonly known as cottage cheese—"smearcase." It is brought to them twice a week in cans, for which they pay about twenty cents per gallon, and by weight in winter three to three and a half cents per pound. They consume in this way the milk of about 2,000 cows annually. Their factory is a massive brick building, 40 by 100 feet, five stories high, with basement, and has a variety of very ingenious machinery, all of which is propelled by steam power, and is capable of making 50,000 of the hand cheeses per day of ten hours, or fifteen millions per year, and does the work of at least fifty hands. The curds, on being received at the factory, fresh from the dairy, are placed in bags holding perhaps a couple of bushels, and are allowed to drain entirely dry. They are then emptied into large wooden troughs, and manipulated with wooden shovels, a certain amount of salt and some caraway seed being mixed through the mass. It is then thoroughly ground up by machinery, before passing into their principal machine, which is a wonderful piece of mechanism. This molds and delivers the cheese on sliding shelves, in three straight rows, automatically pressed into the shape of small cakes, about two inches wide by half an inch thick, which is found the most convenient size and shape for sale and shipment. This is done with the regularity of clock-work, and continues six days in every week in the year, at all seasons.

"The after processes consist simply of these sliding shelves passing and repassing each other, through the hatchways up to the large and well-ventilated drying rooms above, where they are arranged on racks.

"The temperature of these rooms is accurately regulated by a thermometer; in cold weather, hot air or hot steam conveyed in iron pipes being used according to circumstances The whole process of making the "German hand cheese," from the time the curds are received till finally packed in boxes for shipment, occupies about twelve days. The most scrupulous cleanliness and neatness is observed about the establishment in every part, and to secure entirely against danger from dust and flies, the cakes before final shipment all go to the basement, where they are washed in great tubs of water, and again dried.

"The supply of curd comes in winter from Bucks and Montgomery, and in summer from Chester and Delaware counties, for the reason that farmers in the latter do not generally have winter dairies.

"Messrs. Mende Brothers commenced on a small scale six years ago, and the process by which they now manufacture the hand cheese is one of their own invention and improvement, for which they hold several patents. The main difference between theirs and the old mode of making this cheese is that they produce in twelve days an article which will keep and bear transportation all over the United States: whereas the old process requires two to three months, with very uncertain results, and even under the most favorable circumstances is hardly a merchantable article."

The Effect of Color upon Temperature.

Though a matter rarely taken into consideration when decorating the walls of rooms, there is little doubt, says a writer in the *American Builder*, that our health and comfort depend in no slight degree upon the color employed; not from the pleasing effect produced alone, but from the power existing in different colors to seriously affect, either by heightening or lowering the temperature of rooms, the health and comfort of their inmates. It has been conclusively proven that a ray of heat is identical in its character with a ray of light, and that certain surfaces resist and emit heat much more rapidly than others;that the power of reflection,other things being equal,depends in no slight degree upon the color of the object.

The result of a long series of scientific experiments has demonstrated the fact that white substances receive heat much more slowly than dark ones, and, having once become heated, emit the warmth with corresponding slowness. Black objects, on the contrary, heat quickly, and become cold with equal rapidity.

Old stage-drivers, though they may not comprehend the cause, know the extra warmth of a white coat, and afford a standing proof of its practical value.

Now this matter of color, though, as before stated, not often introduced among the considerations in the preparations for building, yet may by judicious management be made to play an important part in conducing both to economy and comfort.

Knowing all this, the natural conclusion arrived at is, that in rooms which require to be at a moderately high temperature the walls should be painted of such a color as will most conduce to the desired effect, and those apartments occupied for sleeping or for summer rooms, should be of such a color as to receive heat slowly, and radiate it with equal slowness. Our sleeping rooms, then, should be universally light in color, in order to prevent those sudden changes which produce such rapid and insidious effects upon sleepers; and our sitting rooms in winter, where a fire is kept constantly, should be of a dark color, to further the rapid heating of the room on cold mornings, from its great qualities of radiation.

Though dark, a room need not necessarily be gloomy in appearance—brilliant colors may be introduced to offset the somber effect and additional warmth produced in appearance as well as in act.

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VOL. XXIII., No. 19 . . [NEW SERIES.] . . *Twenty-fifth Year.*

NEW YORK, SATURDAY, NOVEMBER 5, 1870.

Contents:

(Illustrated articles are marked with an asterisk.)

CHEMISTRY AT THE FAIR OF THE AMERICAN INSTITUTE.

The specimens of photography displayed this year are unusually fine. They exhibit not only an improvement in printing and toning, but also in the management of light. Our artists have evidently studied the effects of lights and shadows to good purpose, and are able to take better pictures than they were a few years ago. There are some fine stereoscopic views by Weil which attract considerable attention. Henry Merz understands the Rembrandt effects and produces pictures of true artistic value; his part of the gallery contains several gems of photographic art.

In Rockwood's section is an application of artificial light to the taking of pictures that must attract the notice of all chemists—it is the magnesium process ingeniously contrived and well executed. Magnesium ribbon is made to revolve around a reel by clockwork, and is fed into an alcohol flame by which it is ignited and kept in combustion; behind the flame is a reflector. A bright kerosene lamp on a side bracket near the sitter serves for focusing and no doubt aids in taking the picture. The particular kind of picture preferred is an ambrotype or ferrotype, as it can be finished in a few minutes. The use of magnesium wire for photography has long been predicted, but now that the price of the metal has been lowered, and its manufacture on a large scale apparently secured, it is probable that we shall have it for many optical experiments. The night pictures are popular and the operator appears to be doing a thriving business. The lamp used for the magnesium ribbon is the invention of G. K. Proctor, of Salem, Mass.

J. Loeffler, of Staten Island, has some fine photographs of dogs and children.

In this Fair is the first exhibition of Albertypes. This process yields prints that are as unfading as the best carbon ink, and possessing a sharpness and definition that cannot be excelled. The method employed by Albert, of Munich, is analogous to that invented by Woodbury, and recently described in this journal. One point of difference is the employment of a carbon ink by Albert, and of presses more like those used in lithography, while Woodbury uses a press constructed especially for manipulating gelatin ink. The Albertypes in the Fair are of great excellence, and excite the hope that the process may prove to be feasible.

Bogardus has an admirable enlarged photograph of Dr. Vinton, of Trinity Church, and other good pictures, and the display by Williamson, of Brooklyn, speaks well for the skill of his chemist and operator.

W. Kurtz exhibits numerous plain and retouched photographs. They bear evidence of having been selected from his stock just as they came, and can be repeated, and duplicated at any time. This artist is worthy of the highest praise for the influence he has exerted in raising the standard of work that ought to be executed by photographers of the present day. He is particularly strong in the manipulation of the background and reflected light so as to produce what are called Rembrandt effects. His pictures afford admirable subjects for study and one in their way unexcelled by any that have ever been taken either in this country or Europe. We do not wonder that the judges are often puzzled to know how to classify photography—whether to call them works of art or chemical productions. Whether photography is a trade or an art, becomes every year more difficult to determine. Perhaps it would be as well to say that in the hands of some people it is a trade while with others it is raised to the dignity of an art.

Messrs. Walter & Baumgarten exhibit specimens of a disinfecting fluid which combines the results of experiments conducted by our Board of Health, and has been shown to accomplish its work better than any compounds hitherto recommended. It is compounded of the following constituents, sesquichloride of iron, chloride of manganese, carbolic acid, and chlorine. A small quantity of this liquid will disinfect sewers, sinks, out-houses, fever hospitals, and cesspools, better than any mixture that has hitherto been tried. It is a decided improvement on chloride of lime, copperas, sulphate of zinc, and other well known disinfectants, and ought to be more generally applied.

There are some specimens of artificial stone in the building, but whether they were made from soluble glass or on the plan of Sorel or Coignet, we could not tell. This branch of chemical technology is now receiving much attention, and we were sorry not to find a greater display of processes.

There was a fine sample of loaf sugar refined without blood, sent from Philadelphia. Whether the purification was accomplished by ozone, sulphites, or chemical means, was not indicated. In cases of this kind the public would be glad to have an explanation of the process.

Parlor matches without sulphur are much preferred as they obviate the suffocation produced by sulphurous acid, and the specimens from the New York Match Company were of an excellent quality. They appear to be made of red phosphorus. A few years ago there were no matches made in this country from the red phosphorus discovered by Professor Schrotter, and it was a great misfortune to the workmen, for phosphorus in this condition is far less poisonous than is the white variety. There has never been a proper supervision of the match manufactory in the United States, and cases of jaw diseases are far too common. Red phosphorus would obviate the evil and afford us equally good results. We therefore hope that the parlor match will meet with proper appreciation.

The carbureting of illuminating gas is exhibited by two parties, both of whom use essentially the same process. It is a curious commentary upon the impure quality of our illuminating gas that it should ever be thought necessary to add certain constituents to it which the manufacturers have failed to give it when first made. Instead of forcing the community to resort to all sorts of patents for overcoming the obstacles imposed by the company, the company ought to be compelled to furnish a gas of a sufficiently high illuminating power to satisfy all wants. The carbureters are certainly useful and practical under present circumstances and are much used in our city.

A new method of distilling whisky is exhibited by Harris. By exhausting the air from the still, it is possible to evaporate and distill at a very low temperature. In this way it is claimed that certain aromatic properties of the whisky are not burnt out, and the solid impurities are retained in the still and can be run out beneath. There was an appalling display of impurities that had been taken from whisky, of various shades of color and nastiness. Some specimens manifestly contained gluten, as something like a yeast fungus was found in the bottom of the bottle containing them. The filth and dirt extracted from whisky ought to deter many persons from indulging in its use, but such did not seem to be the horrifying effect of the display, as most of the passers by were not slow to accept the invitation of the gentlemanly exhibitor to test some of the samples in a wine-glass, that did not admit of being set down until its contents had been drained. The scientific principles upon which the purification of the whisky was accomplished appears to be correct, and if the practical part is equally well sustained, the method ought to find general favor.

There is quite a show of California wines and brandies—not that we would class these articles under the head of chemical products, but set them down as the pure juice of the grape. The port and sherry from the Pacific coast is a close imitation of European brands and quite as good. A wine to be above criticism must not be treated in any chemical way. It must have have its flavor and bouquet as the sunlight gave it. The moment sugar has to be added to neutralize the acid or to increase its alcohol, the wine becomes an artificial one, and ought to receive a name expressive of this fact. Until chemistry has less to do with American wines they can hardly expect to acquire a reputation equal to the famed vintage of Europe. Chemistry is a good thing in its way, but it cannot replace the sweetening influences of bright sunlight and skillful tillage.

The variety of nutritive preparations, condensed food, and medicinal extracts, is unusually large, and if one could believe all that the circulars claim for them we have discovered the elixir of life, and Paracelsus is outdone. There are often really valuable substances among these preparations, but the manner in which they are offered to the public is so suspicious as at once to destroy all faith in them. It is a pity that this should be so, as the introduction of really valuable discoveries is greatly retarded by it.

The chemical department of the Fair is not nearly so full as it ought to be. Many well-known manufacturing houses are not at all represented, and there are numerous inventions on exhibition on by-streets and in obscure offices in the city that ought to be brought out on occasions like this.

The managers are entitled to great credit for the admirable manner in which they have surmounted many difficulties, and have made the wretched building in which they are obliged to hold their Fair, tolerably comfortable.

THE TELLIER ICE MACHINE.

The manufacture of ice by artificial processes is steadily gaining ground and favor. During the last summer it has received a powerful impulse from the exorbitant prices asked and unwillingly paid for ice in this and Southern cities, in which this article has become so much a necessity that people will pay almost any price rather than be deprived of it. In this city its price reached two cents per pound before the close of summer, and in one Southern city we are informed by a correspondent it reached five cents per pound.

It is not probable that such exceptionable prices can be maintained during ensuing seasons, but even at the prices at which we may reasonably hope to purchase ice, or at least such prices as must be demanded for ice shipped to Southern towns, it is now demonstrated it can be produced artificially at large profits and in any required quantity.

Two machines have been brought prominently into public notice, each employing the same volatile material as an absorbent, conveyer, and radiator of heat, and being in some sort rivals in the effort to secure public favor. We allude to those known as the Carré and the Tellier ice machines. The volatile agent in both is generally ammonia, and, though differing widely in detail and cost of construction, they employ the same general principle in the conversion of water into ice.

To the general reader it may be well to state here that the fundamental principle upon which machines of this kind operate is the absorption of heat from surrounding bodies by an expanding substance, the conveying of this heat to some other absorbing body, into which the heat is caused to radiate by the condensation of the conveying substance by mechanical compression, the passing back of the conveying body to extract another modicum of heat from the body to be cooled or frozen, and so on till the desired degree of refrigeration is reached.

It is a physical law with which perhaps some of our readers are not familiar, that the capacity of any substance for heat, that is, its power to absorb heat, and hold it in the latent or insensible state, increases with its expansion and decreases with its condensation. A substance which at ordinary temperatures is a permanent gas, will, when compressed, become sensibly heated; the latent heat which it holds under ordinary circumstances being rendered sensible by condensation. If while in this state the sensible heat be taken up by some other substance and conveyed away, the gas in expanding will seize the heat from surrounding bodies, thus reducing their temperature. The gas on being again compressed will yield this heat to any substance having a lower temperature. The proportion of heat absorbed during expansion, and emitted under pressure, increases with the degree of alternate condensation and expansion.

Ammonia, which is a gas at ordinary temperatures, becomes a liquid under a pressure of from nine to thirteen atmospheres, according to the temperature of the surrounding air, emitting a large amount of heat in so doing, which amount must be restored to it before it can expand to its original volume. On this account it is admirably fitted for use in refrigerating apparatus.

The Tellier machine besides differing much from the Carré machine in matters of detail differs from it in its action, the condensation of the ammonia being in the latter effected entirely by mechanical compression, while in the former the strong affinity of ammonia for water is used in the collection of the gas, the latter being separated from the water again by distillation.

In the Tellier machine the liquefied ammonia is first received into a strong cylinder for convenience of transportation. This cylinder being attached to suitable pipes connected with the machine, the opening of certain cocks allows the ammonia to escape into a distributer or a cylinder connected by pipes with the congealer. The congealer is a square box divided into compartments by hollow metallic partitions, the compartments being filled with the water to be frozen, or they may be filled with a solution of chloride of calcium or salt water, in which are placed metallic molds containing the water to be frozen. The latter is most convenient when very large cakes are desired.

The ammonia passing from the distributer into the hollow metallic partitions of the congealer expands into a gas, absorbing in its expansion a large amount of heat from the fluid contained in the compartments. It is then drawn from the congealer by the pump and forced back again into the distributer in a condensed form. During the process of condensation it gives off its heat to water surrounding a coil through which the gas is passed on its way to the distributer, from which it again passes to the congealer, and so on, being used over and over without material loss.

It will be obvious that any other volatile liquid besides ammonia might be used in the same manner as a conveyor of heat. Methylic ether, etc., are and have been used with success.

It is further obvious that by replacing the hollow partitions of the congealer by a series of bent pipes, air might be cooled if forced through the series of pipes by a fan. This is precisely what is done with an apparatus made by the proprietors of the Tellier machine, the cooled air being supplied to vaults and rooms used for preserving fruits, packing meats, etc., and for purposes of ventilation in churches and public buildings in hot weather. There is, we are informed, no difficulty in reducing and maintaining the temperature to

any desired point down to 32° Fah., and the air being supplied in a dry state is much better adapted to keeping fruits and meats than when charged with vapor from its passage through ice.

From this brief description of the Tellier ice machine our readers will be able to comprehend its operation. It is a beautiful application of one of the most important and fundamental laws of physics in a field of industry destined hereafter to be widely occupied, and to exercise an important influence on the health, comfort, and general welfare of mankind.

THE WAGES OF LABOR.

In the discussion of labor and the wages it obtains in modern times, it seems to us that money, which is only representative in character, or simply a medium of exchange, is too much regarded, and that what it obtains is too often made a secondary consideration, or not considered at all. The true way to regard money is simply as a medium for the transmission and transfer of the necessaries and luxuries of life; and the amount of the latter which can be obtained for a day's work is the proper wages of a day's work.

We often hear complaints of the high prices of various commodities. The purchasing power of a dollar has greatly diminished, yet upon close scrutiny we shall find that laborers of to-day can live better with a given amount of labor than they could have done fifty years ago. Their wages have therefore advanced, not because the laborer can get to-day $2·00 for work, which fifty years ago would have brought him only seventy-five cents, but because the two dollars will purchase to-day more than seventy-five cents would have done fifty years ago. It is not the number of dollars, but what the dollars will get that must be considered.

Twenty years ago a tun of coal would not have cost in this market, on the average, over five dollars at the outside; to-day it perhaps costs eight. Twenty years ago a common laborer could have got at the outside no more than one dollar per day for his work; he would therefore have had to work five days for a tun of coal. To-day he gets two dollars a day, and can get a tun of coal for four days' work.

Fifty years ago a man could travel in stage coaches, etc., say, twenty-five days, at an expense of, say, fifty dollars in money, and, say, eighteen dollars in time to a common laborer—in all, sixty-eight dollars. To-day he can travel the same distance by rail and steamer, in many parts of the country for thirty-six dollars, allowing four dollars a day for his meals and refreshments, and two dollars each night for sleeping accommodations, and two dollars a day as the value of his time; and he can do this with infinitely more comfort and luxury than he could perform the same distance fifty years ago. Fifty years ago he would have needed to work ninety odd days to defray the expense of a thousand miles of travel by coach; to-day he can travel one thousand miles by working eighteen days.

It is true that two dollars is a maximum for the wages of common laborers in cities, and the rate of travel upon which we have figured—two cents a mile—may be considered a minimum, but we should find a large gain if we took the minimum price of labor in rural districts, and the maximum rate of fare on railroads and steamers.

Passing in review the list of commodities and necessities of modern life, we find, in the aggregate, labor gets more comforts, by a given expenditure of muscular energy, than at any former period in its history. Nothing is gained to the cause of labor by ignoring this fact. An argument for a further increase, to be worth anything, must take the position that, although labor is better paid now than formerly, there is still too great disparity between the profits of labor and the profits of capital.

There is much to be said on both sides of this important question. We greatly doubt whether, in the nature of our present social organization, such a disparity is not a necessity. The question is one that will ultimately be settled by experiment, and every strike or demand for increase on the part of labor is a direct experiment bearing upon this vital point. Every concession to such demands on the part of capital is a virtual admission that the disparity of profits may be lessened, without driving capital out of the industry of the world. The limit will be reached when capitalists find that the direct employment of their money in manufacture is less advantageous than loaning it upon interest to co-operative organizations and to commercial men.

There are evidences that in many industries this extreme limit has been closely approximated, and that further demands will force capital out of the field.

What would be the result of such an event upon the working men? In our opinion it would be extremely disastrous. A co-operative establishment working upon borrowed money can rarely, if ever, be as successfully managed as by a single head powerfully interested by the risk of a large investment to do everything possible to promote success. Those who falsely conceive capital to be the natural enemy of labor had better think long and carefully before finally resolving to dissolve partnership with it.

A SINGULAR MONSTROSITY.

H. Besse, M.D., of Delaware, Ohio, sends us an account of a singular human monstrosity born in the vicinity of that town. It is a double child, consisting of two bodies until at the navel the heads being at opposite extremities. The drawing sent us shows the monstrosity to be of the female sex, the legs project at right angles from the body on each side. On one side they are separated, but on the other they are united into a double limb. The arms, busts, and heads are well formed and distinct; in short, the upper extremities are all well developed, and all the functions of nutrition are so well performed that the double child has survived ten days, and appears likely to live. Dr. Besse regards this as one of the wonders of the world, yet there are numerous instances of similar monstrosities on record. A considerable number of these are described in the transactions of the New York State Medical Society of 1866, in an extensive essay by G. J. Fisher, M.D. As a rule, however, such monstrous births are accompanied by inherent weakness of constitution which seems a merciful provision to secure the early death of these unfortunate creatures.

A SECOND ROGER BACON, AND A CENTURY OF INVENTIONS (ALMOST).

A correspondent has written us from Melbourne, Australia, recalling to our remembrance the fact that twenty years since he did some business at our office, and giving some account of his career as an author and inventor. He might add, we think, "traveler," since he seems to be one of those roving, restless men of which this country is so prolific.

He says, at the time he called on us in 1850, we were "a remarkably good-looking gentleman." If he could only see how twenty years of earnest work has developed the embryonic loveliness which captivated him at the time of which he speaks, what would he say? It would almost repay him for a pilgrimage from the land of nuggets to get a good square look at us.

But we did not intend to say anything about our personal beauty on this occasion, though it is a theme on which we delight to dwell. Our remarks on this head have somehow slipped in like the head of Charles I. into Mr. Dick's Memorial, in spite of ourselves. The reader will please pardon the digression.

Our correspondent says he is the author of "A Lyric for the Times," a patriotic song, dedicated to the editor of the New York *Times*. The "Icon Poems," he states, first published in the London Weekly *Times*, and somewhat extensively copied in American papers, were written by him. To American papers, he states, he has been an extensive contributor, citing as those indebted to his pen for political, practical, and other contributions, no less than seven prominent papers in the United States.

He states that he was once assistant editor of a prominent daily paper in Chicago, and that he himself published and edited a Western journal in 1852. He gives names and dates, but desires us to suppress them. He names as among his former friends and correspondents many prominent American citizens and authors.

The first false step our correspondent seems to have made was leaving this country for England, where he in less than three months found himself reduced to labor in an iron works at the wages of sixteen shillings per week. He says:

"While there your correspondent of London wrote to me without fee or reward a score of letters, for which their fees ought to have been $200. They took out for me afterwards patent No. 2,141, 1860, at London. They volunteered the use of their name as a reference and introduction. Charles May, F.R.S., F.R.A.S., C.E., told me that he had a fellow-feeling for me as an inventor, and that he would help me gratis. He wrote me a number of letters, for which his fees ought to have been at least $100, and was becoming much interested in my case, when he died suddenly. But for his sudden departure, I think I should never have been buried alive in the woods of Australia.

"While I was pushing a hand-cart about the streets of Wolverhampton for daily bread, I received a letter from the Earl of D., saying that if I would call upon him he would be glad to see me. Such an invitation was not to be slighted—he gave me a bank note—all honor to him—which indirectly enabled me to publish my book.

"At length finding that I could not invent any way to do without eating and drinking in London—I embarked for Queensland, Australia, December, 1861. The voyage cost me one shilling and twopence sterling—I thought it was lucky it did not cost any more! I sailed with a sad heart. I thought (and still think) that Australia is one of the last countries in the world for an inventor to go to. The idea of a Special Providence is irrational, unscientific, and untenable, but as the good of all mankind is always brought about by the one agency, general Providence is special Providence, and *vice versa*. It is then providential, or at least fortuitous, that I have lived an anchorite sort of life, in intense solitude, in the wilds of Australia. Seventy out of eighty of my inventions owe their origin to that isolation."

Our correspondent now, after eight years of Australian life, finds himself too poor to return to America, where he thinks his inventions might be turned to account. If anybody stands in need of an inventor, with eighty inventions ready made to hand, here is a chance to import one, who, to use his own words, "trembles at the idea of what he knows being lost to the world."

Only three of the inventions made by him are directly alluded to in his letter. One is a letter seal, which prevents a letter from being opened without defacing its contents, and thus betraying that it has been tampered with. Another is a grain-binding machine, which will bind grain with straw, wire, or cord, at a rapid rate, and very cheaply, and the third invention, he says, previous to its description, "will make us open our eyes with astonishment." We did so, and shut them again without difficulty. Whether our readers will be able to do the same after reading what he says about it, we cannot say, but we will take the risk.

He calls this invention the "Silent Power," or "Fulcrum Sui Generis." Professor Fithian's "Vertical Multiplier" cannot hold a candle to it. Our correspondent thus describes it:

"You know well that a common fulcrum presses as much backwards as the lever presses forwards, or upwards as much as the lever downwards, or downwards as much as the lever upwards. The *Fulcrum sui generis* is a fulcrum which will not press backwards while the lever presses forwards till certain materials of which the fulcrum is made are crushed or torn in pieces. For illustration: By means of compressed leverage on board the *Great Eastern* steamship, I can lift 1,000 tuns of cargo, one end of the ark which contains the cargo being suspended from the stern, the other, the lightest end, being raised by the above-mentioned leverage at the bow. The weight raised by the common lever would fall backwards as much as forwards, but with Cooper's Silent Power, 90 per cent of the weight pulls forwards, 10 per cent downwards—NONE AT ALL BACKWARDS, 'tis all very easy! A carriage on wheels or a vessel in the water will rush forwards with incredible and constantly-increasing velocity as long as the center of gravity is suspended forwards. In order to understand this, take a small toy carriage well placed on four of the best wheels and axles that can be made. Erect a gallows—two uprights and a cross-beam—at the middle of the carriage, suspend a leaden plummet about half the weight of the carriage from the cross-beam (just as you or I might be suspended—just as many a man as good as either has been), place the carriage on the smooth top of your longest mahogany, hold the carriage with one hand and the plummet stretched horizontally forwards with the other hand, let go of both at the same moment, and the carriage will rush forwards at great and increasing velocity.

"In the very earliest stage of this invention a toy boat placed on a pond of water, and let go of, rushed across the pond at the rate of twenty miles an hour by force of the 'silent power.'

"On still water in a bayou of the Yarra, near Melbourne, I moved a boat twenty-four feet long, with myself and two boys in it, by the force of the silent power—that is to say, with nothing whatever projecting from the boat into the water—nothing whatever reaching from the boat to the shore or the bottom. I know as well as I know my own existence, that I can propel the *Great Eastern* steamship with great and increasing velocity by means of my silent power—that is to say, one man can propel that ship faster by far than all her steam engines can do. There is but one limit to speed by means of the silent power, and that is strength of materials. I can attain to any speed that is safe. I can do more; I could allow the rate to progress till the pressure of the water would collapse the bows of the strongest ship ever built."

Here is a power that is a power, ready and willing to be imported, and trembling lest it shall die and be buried in the wilds of Australia.

We should not have occupied so much space with this communication did it not serve to point a useful moral. Our correspondent is not the only specimen, though, as Josh Billings would say, a "loud" one of his class.

Evidently a man of more than average ability, we find him steadily going down from prosperity to poverty, and by lack of persistence in any one field of effort, losing all influence in any. His idea of the "Silent Power" is evidently the outgrowth of a morbid condition of mind, which, perhaps, has been from the outset of his career growing upon him, until he really thinks he can perform mechanical miracles.

Ah, these "rolling stones!" How one finds them scattered all along the pathway of life, their sides worn with the attrition of the currents that have drifted them; battered, bruised, and broken, and crumbling at last to dust without ever having subserved any important and useful purpose, except, perhaps, at brief intervals. Nothing perhaps is more pitiable than a life wasted in this way, yet it has its humorous features too. Let us smile at it when we must, pity it when we can, and avoid for ourselves the mistakes which so wreck men capable, if their efforts were concentrated, of achieving at least fair average success.

SCIENTIFIC INTELLIGENCE.

MAGNESIUM AS A REDUCING AGENT.

Metallic magnesium in the form of powder is a powerful reducing agent. A solution of chloride of platinum is instantly decomposed by it at ordinary temperature, and with strong evolution of hydrogen gas, the finest platinum sponge separates. Pure gold in powder can also be precipitated from the ter-chloride, and even chloride of zinc is decomposed and the metal separated by magnesium. This use of magnesium is destined to become a very important one.

COLD BY COMPRESSED AIR.

The principle of compressed air to produce cold, applied in Kirk's machine, has been adopted by Windhaus in a newly constructed apparatus, but the whole thing is declared by engineers to be impractical, in as much as the amount of heat that can be removed by mechanical means bears a very unfavorable proportion to the power applied.

By theoretical calculation it appears that with a compressed-air machine of one-horse power no more than 60 to 70 pounds of ice can be produced in ten hours. This makes the ice cost too much for practical purposes.

GREEN GLASS FOR THE DARK ROOM OF PHOTOGRAPHERS.

Mr. Gaffield, of Boston, has shown that while chemical rays to a slight degree will pass through yellow glass, they are perfectly excluded by green and red. This has suggested to photographers to substitute green glass for the yellow in the developing and fixing room. The yellow light is very trying to the eyes, while the green light is very agreeable.

Carey Lea recommends the green glass, after an experience in the preparation of hundreds of plates where it had been substituted for the yellow panes.

PHOTOGRAPHING SUN-FLAMES.

Professor Young, of Dartmouth College has succeeded in obtaining photographs of protuberances on the sun's limb, of which copies were exhibited at the Lyceum of Natural History. They were made by attaching a small camera to the eye-piece of the telescope, and opening the slit somewhat widely, and working through the hydrogen line, G. If this apparatus can be made to work we can obtain pictures without an eclipse.

[Our Special Correspondence.]

LETTERS FROM THE SOUTH.

Notes in the South—Alabama—Railroads and Mineral Resources—The famous Shelby Furnace—North-Western Georgia.

ROME, GA., S. R. & D. R. R., Sept. 26, 1870.

I came here *via* the Selma, Rome, & Dalton R. R., which though planned and partially built previous to the war, has since 1866 been completed and much improved by Northern capital. Among the parties so interested are many prominent names in New York. John Tucker, of Philadelphia, is now president, while Mr. M. Stanton, one of the superintendents, is from Boston.

The road passes through a fine farming region, and just skirts the largest deposits of iron in America, and one of the largest coal fields. Alabama may truly be called the Pennsylvania of the South, and, with a liberal policy upon the part of her railroad men, her mineral resources will eventually be a source of great wealth. She has over 4,500 square miles of available coal lands—bituminous, cannel, splint, and semi-bituminous, very much resembling Cumberland—and her iron beds and veins are hundreds of miles in length. One, 14 feet wide, is traceable on the surface for over 50 miles.

Limestone, marble, and excellent sandstone, are equally abundant. At Lime-kiln Station, at the junction of S. R. & D. R. R., and the new N. & S. R. R., a Northern man has a series of excellently constructed kilns, and is making money, supplying lime far and near, while his neat residence and beautiful farm are the admiration of every passenger. On the east of the middle of the State an abundance of fine granite is easily quarried. For the good of the State, as yet no gold has been found. Some copper, lead, and zinc, are said to exist; but there is no organized working of the mines at this time.

Manganese is also found, and there are traces of some other of the metallic minerals. The great mineral resources of the State are iron and coal, which, although most common, yet contribute most to the wealth of every country. Not least either is the immense wealth of her lands and forests. Alabama will probably average a higher grade of fertility than any other Southern State.

Previous to the war there were in the State of Alabama ten furnaces, which hardly made more than 3,000 tuns of pig iron a year, as many of them only ran in winter, the others irregularly. During the war these furnaces were increased in numbers and capacity. Amid the crash of contending armies nearly all were burned. To-day there are five—three new—and one of these produces as much iron, probably, as all did before the war. There are two more ten-tun furnaces now building, and still three more projected. All are now charcoal furnaces, but one for coke is talked of. At Brierfield there is a rolling-mill, but for some reason it is not very actively employed. When I was there they were engaged rolling cotton ties. A furnace is also there. Things seemed dull, want of capital was alleged as the cause. I was informed by others that charcoal was scarce and high, and that to work the furnace profitably it must be made fit for coke. Coal is near at hand. The other furnaces are: A small one near the Mississippi in N. U. Alabama; two near Round Mt., on the Coosa River, owned by Messrs. Noble of Rome, and the Shelby Co. Furnace.

Of this last I propose to speak specially. All on the railroad lines and in towns, wherever I talked of iron or iron works, I heard of the Shelby Furnace, which was making 30 tuns of iron a day, with 90 bushels of charcoal to the tun. As many of my readers are aware, this is a yield and a proportion unprecedented in the history of iron manufacture. Hence I determined to see if the statements I heard were true, and how it was done. The furnace is located six miles from the S. R. & D. R. R., at Columbiana—a branch road runs out to it, owned and worked by the Iron Company. The ore used is a porous brown hematite, sometimes massive, and changing to what is called by the miners needle ore; frequently occurring in hollow balls or hollows occurring in the masses, which are filled with a silicious substance resembling fine scoria, or pumice stone, or furnace cinder, of first grade. The furnace is well located in the side of the ore-hill. It was built during the war, burned by Gen. Wilson, and rebuilt about two years ago by a New York Company. Previous to the war there were two small furnaces there working irregularly. During the war a rolling mill was also burned, and is not yet rebuilt. The ore-bed is inexhaustible, and if it were not, there is abundance more in the neighborhood.

As originally built the furnace was 36 feet high, last spring it was run up, by Mr. Bailey, of Poughkeepsie, to 56 feet. It is now 36 feet from bottom of hearth to top, and 53 feet to charging point; has 12-feet boshes, and the furnace tapers three-eighths of an inch to the foot from the bosh to 6 feet of the top. The bosh is 4 feet high; the hearth 6 feet high; 4 feet × 3½ feet at the bottom, and 4 × 4 at top. The hearth lining at present is of sandstone, and is burned out in about six months. Fire-bricks were formerly used, and it is intended to go back to them again.

During the past six months (a week less at date of our visit) they have made over 3,800 tuns of iron with an average of 98½ bushels of charcoal to the tun. They made on one day 31 tuns of iron with 92 bushels to the tun. When I visited the furnace they were making 16¾ tuns with 104¼ bushels to the tun, but the hearth was entirely gone, and they were only waiting the superintendent's arrival, to go out of blast. The furnace man told me that since increasing the hight of the furnace, it carried 875 to 900 pounds of ore on the same coal as it did 500 tuns before. From three weeks of their workings I extract the following:

Lime.	Ore.	Coal burned.	Yield.
58,800 lbs.	611,270 lbs.	16,170 bush.	149 tuns.
58,320	619,000	16,068	153
64,000	610,820	17,600	178

Their best week's work was 184¼ tuns. Their best day's run was: Lime, 10,080 lbs; ore, 113,400; coal, 2,772 bushels; yield, 71,050 pounds.

This is the simple truth of the workings of this Shelby Company Furnace. Walter Crafts, superintendent, was, I regret, absent during my visit. They state their iron as costing them $20 per tun. They pay 7½ cents per bushel for charcoal, $2 per tun for limestone, $1·12½ for the amount of ore used to make a tun of iron. I could not see where the $20 came from. Mr. Hazard, the Secretary, who, I may add, politely and freely gave me access to all their books, replied: "Well, by the time the charcoal is measured up with waste, etc., it costs fully 9½ cents, then you may safely put the ore at $1·50. Then say 100 bushels of coal, $9·50; ore, $1·50; then lime, 50 cents, and you have $11·50; put on $2·50 more for furnace, men, etc., and you have $14." "But you have $6 more." "Well, sir, this railroad we have to keep up costs us about that much on every tun, especially when you include salaries and repairs."

They make three grades of iron, and sell it, delivered at Columbiana, at from $35 to $40. Four fifths of their iron, is, however, A. No. 1. I have been thus full in giving details of this furnace because of the reputation it has acquired. In my opinion the great yield is due to the unusual hight of the furnace, and still more, perhaps, to the peculiar tractability of the ore. Hot blast is used, and the charcoal is made in ovens of capacity of 65 cords, and the yield is about 50 bushels to a cord.

Twenty miles from Rome a furnace is being put up by the Etna Iron Company. It is to be an iron stack, 45 feet high, with 10-foot boshes, cold blast; ore, brown hematite. At Oxford there was a large furnace during the war, and the ore deposit is one of the largest and most remarkable in the world. The erection of a furnace of about 10 tuns capacity is just being commenced.

At Cornwall, near Round Mount, there are two furnaces, one kept in blast all the time. These are thirty miles north of the S. R. & D. R. R., and three miles from navigable water on the Coosa. The Coosa Coal Field is within a few miles of the Etna Iron Company's works. The furnaces are of the same size, 8-foot bosh, 36 feet high, and they make about 60 tuns a week. They use cold blast, and consume about 175 bushels of coal to the tun. The ore is the red fossiliferous, and as seems strange, their iron is almost entirely free from phosphorus. A large deposit of this ore extends along the Coosa for many miles.

These last furnaces are owned chiefly by Wm. Noble & Sons, of Rome, Ga.; they use the iron in great measure, in their rolling-mill and car-wheel works. These I visited. They make about 200 car wheels a week, which go all over the West and South. Their rolling mill has a capacity of about 15 tuns per day, and they were just putting up a complete set of nail machines. They also forge car axles. Mr. Noble, Sr., is an Englishman, who came to Rome a poor man. He has not only accumulated a large fortune, but has immensely benefited that section.

Rome is eligibly located for manufacturing purposes, just at the junction of the Etowah and Oostenaula. These streams form the Coosa, which is navigable far down into Alabama. Steamboats run regularly on it. Agriculturally it is a fine region, and almost any but a strictly tropical crop may be raised. The soil is limestone, and all cereals grow finely. The people are waking up to new ideas, and had on October 10th and 11th one of the best district fairs in the South. It is a section where I could recommend a Northern man to settle.

Historically, the place is noted as the great central town of the Georgia Cherokees, the home of Ross, and the place where McIntosh was murdered. The scenery around the town is very fine, the mountain air healthy and invigorating. A railroad thence to Decatur, Ala., and one to Chatanooga, are expected to add new life to the town.

Allow me to tender my thanks to Col. Dwinell, of the Rome *Courier*, for many kind attentions during my stay there.

H. E. C.

THE VALUE OF THE HONEY BEE IN AGRICULTURE.

Honey and wax have ever been two most useful articles in domestic economy, and, from the earliest times, the honey bee has been the companion of man. What an addition to a farmer's house is a beehive, nestling among the apple trees with its hundreds of busy inhabitants, some settling about the door, or flying lightly above the roof, others darting off in quest of new supplies of food, and still others returning on laboring wings laden down with their "baskets" filled with crude pollen. What a scene of industry and system is bee life! This is an every-day picture. But honey and wax are not indispensable. The hunting of the sperm whale and the discovery of petroleum have done away with the need of wax, and the sugar cane and beets give us sweets in new and more convenient forms. What use then, is the bee? our reader will ask. The answer will recur to but a few. The grand use in nature of the bee is the securing to the farmer or fruit raiser a good crop and the permanence of the best varieties of fruit.

Gardeners have always known that bees fertilize squash, melon, and cucumber flowers by conveying the pollen from one plant to another, thus insuring not only the complete fertilization of the seed by the male pollen and thus improving the fruit, but actually causing the production of more squashes, melons, and cucumbers by causing certain flowers to set that otherwise would have dropped to the ground sterile and useless. This has been proved by fertilizing the flowers by hand; a very large, indeed an unnaturally abundant crop being thus obtained. It has been noticed by a few, though the many have not appreciated the fact, that fruit trees are more productive when a swarm of bees is placed among them, for when the bees have been removed by disease or other means, fruit crop has diminished.

On this subject I wrote as follows to a correspondent in the pages of the *American Naturalist*, a monthly illustrated magazine of natural history published by the Peabody Academy of Science, at Salem, Mass.

"In answer to the question by J. J. Gould, Wenham, Mass., whether bees are in any way injurious to fruit or lessen the quality or quantity, I would reply, that all the evidence given by botanists and zoologists, who have specially studied this subject, shows that bees improve the quality and tend to increase the quantity of the fruit. They aid in the fertilization of flowers, thus preventing the occurrence of sterile flowers, and by more thoroughly fertilizing flowers already perfect, render the production of sound and well developed fruit more sure. Many botanists think if it were not for bees and other insects [such as certain two-winged flies, moths, wasps, etc.], many plants would not fruit at all. This whole subject of the great office bees and other insects perform in the fertilization of plants has been fully discussed in the May, July, and October (1867) numbers of the *American Naturalist*, and by Professor Asa Gray, in the *American Agriculturist*, beginning in May, 1866. "It is alleged that bees do injury in some way by extracting the honey from flowers. What is the use in nature of honey? The best observers will tell you that it is secreted by the plant for the very purpose of attracting bees to the flower, otherwise, it is of no use to the flower or fruit."

This was written before Mr. Samuel Wagner printed an article on the same subject in his well-kown and useful *American Bee Journal*. His testimony so well confirms my statement, made above, and is so important to fruit raisers, that I reproduce it in part.

"In 1774 Count Anthony, of Torrings, Seefield, in Bavaria, President of the Academy of Science, at Munich, striving to re-introduce bee culture on his patrimonial estate, found in this generally prevalent prejudice (*i. e.*, that the bee injures the fruit by its visits to the flowers) the chief obstacle to success. To overcome it, he labored assiduously to show that bees, far from being injurious, were directly beneficial in the fructification of blossoms—causing the fruit to set, by conveying the fertilizing pollen from tree to tree and from flower to flower. He proved moreover, by official family records, that a century earlier, when bees were kept by every tenant on the estate, fruit was abundant; whereas, then, when only seven kept bees, and none of these had more than three colonies, fruit was scarcer than ever among the tenantry.

"At the Apiarian General Convention, held at Stuttgard, Wirtemburg, in September, 1858, the subject of honey-yielding crops being under discussion, the celebrated pomologist, Professor Lucas, one of the directors of the Hohenhein Institute, alluding to the prejudice, went on to say: 'Of more importance, however, is the improved management of our fruit trees. Here the interests of the horticulturist and the bee-keeper combine and run parallel. A judicious pruning of our fruit trees will cause them to blossom more freely, and yield honey more plentifully. I would urge attention to this on those particularly who are both fruit growers and bee-keepers. A careful and observant bee-keeper at Potsdam writes to me that his trees yield decidedly larger crops since he has established an apiary in his orchard, and the annual crop is now more certain and regular than before, though his trees had always received due attention.'

"Some years ago a wealthy lady in Germany established a green house, at considerable cost, and stocked it with a great variety of choice native and exotic fruit trees—expecting in due time to have remunerating crops. Time passed, and annually there was a superabundance of blossoms, with only very little fruit. Various plans were devised and adopted to bring the trees to bearing, but without success, till it was suggested that the blossoms needed fertilization, and that, by means of bees, the needed work could be effected. A hive of busy honey gatherers was introduced next season; the remedy was effectual—there was no longer any difficulty in producing crops there. The bees distributed the pollen, and the setting of the fruit followed naturally."

From these convincing facts we learn the value of the honey bee to agriculture. Blot them out and we must go almost entirely without fruit and vegetables. Besides being a source of profit for their honey and wax, the bee actually brings to our doors loads of fruits and vegetables and other products of the farm.—*Annals of Bee Culture*, 1870.

Respiratory Surface of Human Lungs.

According to Hopley's "Lectures on the Education of Man," the number of air-cells in the human lungs "amount to no less than six hundred millions." According to Dr. Hales, the diameter of each of these may be reckoned at the 100th of an inch; while according to the more recent researches of Professor Weber, the diameters vary between the 70th and the 200th of an inch. Now, estimating the internal surface of a single cell as about equal to that of a hollow globule of equal

internal diameter, then, by adopting the measurement of Hales, we find that 600 million such cells would possess collectively a surface of no less than 145 square yards; but by basing our calculations on the opinions of Weber—opinions, remember, which the scientific world receives as facts—we arrive at the still more astounding conclusion, that the human lungs possess upwards of 166 square yards of respiratory surface, every single point of which is in constant and immediate contact with the atmosphere inspired. It will be useful, then, to imprint on the memory, that, whether we breathe pure or putrid air, the air inspired is ever in immediate contact with an extent of vital surface ample enough for the erection of a large house.

The Hartford Steam Boiler Inspection and Insurance Company.

The Hartford Steam Boiler Inspection and Insurance Company makes the following report of its inspections for the month of September, 1870:

During the month, 334 visits of inspection have been made and 703 boilers examined—633 externally and 200 internally, while 89 have been tested by hydraulic pressure. Number of defects in all discovered, 374, of which 45 were regarded as dangerous. These defects in detail are as follows:

Furnaces out of shape, 11—1 dangerous; fractures, in all, 20—3 dangerous; burned plates, 25—6 dangerous; blistered plates, 32—4 dangerous; cases of sediment and deposit, 73—2 dangerous; cases of external corrosion, 22—3 dangerous; cases of incrustation and scale, 42—3 dangerous; cases of internal corrosion, 10—1 dangerous; cases of internal grooving, 4; water gages out of order, 26—2 dangerous; blow-out apparatus out of order, 4—1 dangerous; safety valves overloaded, 17—7 dangerous; pressure gages of order, 59—4 dangerous; boilers without gages, 2; cases of deficiency of water, 5—1 dangerous; broken braces and stays, 24—7 dangerous; boilers condemned, 4.

Among the pressure gages out of order were several in very bad condition, varying from +10 to −20. We have so often commented on this difficulty, pointing out the cause and the remedy, that there is little more to be said. But we will say, whenever for any reason a steam gage is suspected of being in bad condition, have it at once compared with a gage known to be correct. There are many cases of sediment, deposit, incrustation, and scale. If these are not attended to, the boiler is liable to be injured from the plates around the fire being burned. Every boiler should have hand holes in abundance, and in suitable places. In those of horizontal tubular type this is very important. Hand holes should be provided at each end, and the boilers should be so set that easy access to them may be had.

Bee Stings.

The fear of being stung deters many from bee-keeping. This is excusable in those whose peculiar physical organization is such that much pain and inflammation result; but such are in the minority. The danger of being stung is not so great as is generally supposed. The bees seem to know the timid, while those who approach and handle them with courage, carelessness, and confidence, can go among them without annoyance. It may be an annoyance to the novice to be stung, from the pain and swelling, but in a few seasons the system will become so accustomed to the poison that but slight swelling and no pain will result. The pain is more in the imagination than reality, and the sooner the beginner becomes so self-possessed as to receive the sting of a bee as he would the scratch of a brier, the sooner he will succeed as an apiculturalist, for if he is forever in terror of his bees he will not give them the attention they need, and will never attain the best results.

No outward application can have any effect in curing the sting of a bee, although everybody has some remedy that, you will be told, is instantaneous relief. You can not go amiss should you apply in every instance the first thing you lay your hands on. A list of remedies we have heard of would fill the "Annals of Bee Culture" and should you try them all you would find all of them equally efficient. All that can be done when you are stung is to carefully extract the sting, which should not be done by taking hold of it with the fingers, as the poison sack at the root of the sting would thus be discharged into the wound.

It is better to remove it with the edge of a knife, or if none is convenient then with the finger nail. The swelling may be partially prevented or even nearly removed after it takes place by rubbing with the hand, being careful to rub in the direction of the heart, as by that means the poison may be thrown into the circulation and distributed through the system without injury.

Melting Steel Plates and Other Material.

The committee appointed by the Secretary of the Treasury, recently witnessed the melting in a blast furnace, at the navy yard, Washington, of a number of plates and other materials captured from counterfeiters, and which had been used by them in counterfeiting money and stamps; also, the plates, dies, etc., of the fifty-cent fractional currency note of the ourth issue, first series. The committee at the same time witnessed the destruction in the same manner of the face and back plates, dies, bed, piers, rolls, etc., of the five-dollar notes of forty-nine national banks which have failed or given notice of liquidation, which plates were engraved by the Continental Bank Note Company. The amount of steel plates, dies, tools, etc., melted in the presence of the committee was between three and four tuns.

THE standard of our gold and silver coin is one part alloy, and nine parts pure metal.

IT is reported that Commissioner Fisher will resign his office on the first of next January. At the instance of Secretary Cox, Col. Fisher gave up a lucrative patent-law practice to accept the office of Commissioner of Patents. He has discharged his duties with marked ability, and has introduced many wholesome reforms. We shall regret to hear of his final determination to vacate a position which he has so ably filled.

CORRECTIONS.—In our notice of emery grinders manufactured by the Union Stone Company, on exhibition at the Fair of the American Institute, published on page 265, current vo'ume, the Union Stone Company was named as the exhibitor. The exhibitor of the goods in question was the American Twist Drill Company, whose address is Woonsocket, R. I. The name of the inventor of the traction engine described on page 246 is James K. Lake, instead of D. J. Lake, as there stated.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at $1·00 a line, under the head of "Business and Personal.

All reference to back numbers should be by volume and page.

F. L. V. H., of N. J.—Carbolic acid may be obtained by collecting separately in the distillation those portions of the oil of coal tar which boil between 300° and 400° Fah. These portions are then mixed with a hot saturated solution of caustic potash, with the addition of a quantity of powdered hydrate of potassa. A copious white crystalline substance will immediately separate on addition of the potassa, and the remaining liquid is removed by decantation. The white substance is then dissolved in water. The solution as it becomes quiet separates into two layers. The bottom layer is a solution of carbolate of potassa. This is separated from the upper layer, and treated with hydrochloric acid till the potassa is neutralized. The carbolic acid is thus freed from its combination with the potassa, and rises to the surface. It is then digested with chloride of calcium to remove the water which it contains, and afterwards distilled and exposed to a gradually lowering temperature, when it crystallizes in long colorless needles. This is Laurent's method. There are other modes of procedure, but this will probably answer your purpose. —The gum used on postage stamps is not poisonous. It is simply gum dextrine made from starch. There is nothing added to give the sweet taste which properly belongs to the gum itself.

J. L., of N. Y., has been trying to construct a poultry fountain, on the ollowing plan, taken from an English work called the "Poultry Book." A common flower pot with the hole in the bottom tightly corked, has a hole bored from half an inch to an inch from its upper edge. It is then filled with water up to the hole thus bored. The saucer is then put over the top like a cover, and the whole apparatus inverted. The water then flows out under the edge of the pot, and air enters the hole near the edge, until the water rises around the pot in the saucer sufficiently to cover the hole. As the admission of air is then stopped the water ceases to flow out until either by evaporation or by the fowls drinking the water from the saucer the level therein is lowered so that air again enters the hole. The water is thus gradually fed into the saucer as wanted. Our correspondent has tried to make such a fountain of galvanized iron, and failed. He now inquires whether the principle of it is correct. We answer that it is, and that he has either not fol followed the directions in the construction, or some leak admits air above the level of the water in the saucer.

J. W. H., of ——, wants a gas stove, and says he has seen but one, which was a very ungainly looking article. There are plenty of elegant devices of this kind in market, and if our correspondent will take a look through the stove stores of any large city, he will, we think find no trouble in suiting himself with a stove which will do minor cooking very well. There is, however, room for profitable improvement in this field. The baking power of most devices of this kind is very inferior.

A. M., of Ill.—The gloss produced on shirt bosoms by manufacturers, is obtained through the addition of a small proportion of spermaceti or white wax to the starch while boiling. We do not know the exact proportions, but a little experiment will soon enable you to fix upon them.

D. D. K., of ——.—Your question in its present form is entirely unanswerable. The number of pounds of coal necessary to generate a pound pressure in a boiler, depends upon a great many circumstances, and probably no two boilers could be constructed that would be uniform in this respect.

J. D. W., of Mo.—If you wish to increase the velocity of the discharge from a force pump over that of the flow through the induction pipe, it is necessary to make the sectional area of the discharge pipe, at the point of discharge less than that of the induction pipe.

J. R. L., of La., wishes a recipe for welding cast steel. Hard cast-steel, rich in carbon, according to the best authorities, cannot be welded to steel, but it may be to iron. What can our practical steel forgers say on this subject?

J. S. R., of Ohio.—To tin iron, first clean the surface by the use of acids or other means, so that it is uniformly bright. Then dip in a bath of melted tin, upon the surface of which there is kept a quantity of melted tallow free from salt.

J. P. L., of Ohio.—Whalebone of commerce is taken from the mouth of the whale, where it exists in layers on the inner side of the jaw. It splits very easily, and is thus separated into pieces of convenient size for handling.

J. S. P., of N. Y.—The motion of the clock-work regulating equatorial telescopes does not vary in any material respect from that of the ordinary clock. The pendulum is the regulator, and as the motion of the escapement is intermittent, so is the motion of the instrument.

D. T., of Md.—It is impossible to say what is the matter with your engine at this distance, and from the description you give. It needs personal examination by an expert.

R. C. P., of ——, is in difficulty with his brass castings. They will not run solid, but come out honey-combed and porous. Can any of our correspondents give him the cause and the remedy.

W. H. B., of ——.—We see no radical defect in the method of making balloons, proposed by you, but think you will meet with practical difficulties you do not now anticipate.

G. N. L., of ——.—The red color of the Aurora Borealis, is a phenomenon quite familiar to meteorologists. Its cause has often been speculated upon, but never determined.

J. J. H., of Md.—A line in our "Business and Personal" column, will probably secure you the information you seek.

A. D. L., of Ill., wishes to know how steel watch chains, keys, etc., are polished.

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Inventions Examined at the Patent Office.—Inventors can have a careful search made at the Patent Office into the novelty of their inventions, and receive a report in writing as to the probable success of the application. Send sketch and description by mail, inclosing fee of $5. Address MUNN & CO. 37 Park Row New York.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

MEDICAL COMPOUND.—J. D. Love, Oregon City, Oregon.—The object of his invention is to provide a remedy for rheumatism and all kindred diseases.

SPRING BED BOTTOM.—Philip Stovall, Newman, Georgia.—This invention relates to a new and useful improvement in spring bed bottoms whereby they are made cheaper, more elastic, and more durable than they have hitherto been.

WRITING CASE OR DESK.—Ernest Scheel, New York city.—This invention relates to a new writing case which is provided with a flexible slat cover that is moved into the case for opening the same. The invention consists i connecting the said cover with a drawer in such manner that by opening the said drawer the cover will be concealed.

SKATE.—Corydon Wheat, Geneva, N. Y.—This invention relates to a new manner of constructing the runner of a skate, securing the bearings to the same and the straps to the latter.

KNIFE.—Peter Houseman and C. C. Campbell, Rural Retreat, Va.—This invention has for its object to provide knives for cutting tobacco and other purposes, with broad thumb-rests for protecting the thumbs and preventing their being worked sore on the backs of the knives.

LAMP WICK TAG.—P. J. Skinner, Oswego, N. Y.—The object of this invention is to provide convenient means for introducing the wicks of lamps into the wick tubes, and it consists in attaching a tag formed of pasteboard or paper or some equivalent substance to one end of the wick, so that the same shall be more rigid than the wick, and be readily introduced into the tube.

MOSQUITO BAR.—Theophile Masac, Good Hope Plantation, Parish of St. Charles, La.—This invention relates to a new bedstead attachment for supporting mosquito nets. The object of the invention is to do away with the cumbersome posts, fixtures, and bedskies which are at present required for supporting mosquito nets, and which are all great impediments in moving, and crowd the bedroom beyond measure.

STEAM ENGINE.—Philip Estes, Leavenworth, Kansas.—This invention relates to a new and useful improvement in steam engines, whereby they are endered more effective, useful, and economical than they have hitherto been, and the invention consists in constructing and arranging the valves and their seats in such a manner that the exhaust ports remain open during the entire stroke of the piston, while the valves are balanced and consequently made to work without friction.

CIDER MILL.—J. K. P. Smith, Jeffersonville, Ind.—This invention relates to a new and useful improvement in mills for grinding apples in the process of making cider, which mill may be used for crushing or grinding other fruits or substances preparatory to expressing the juice therefrom.

ASPHALT PAVEMENT.—A. C. Campbell, New York city.—This invention relates to a new and improved mode of mixing asphaltum or any asphaltic preparation with mineral matter or with rocks crushed or pulverized, or with any pulverulent earth, as clay, marl, etc., with the object of bringing about a more thorough union of the materials, and thereby forming a more suitable product for paving streets, sidewalks, etc., and for flooring and other purposes.

HAY AND COTTON PRESS.—J. H. Johnson, Griffin, Ga.—This invention consists in attaching the platen to a rack which is elevated and depressed by a pinion secured to a shaft that is operated by a ratchet wheel and pawl; also in the use of a pendulum-lever in connection with the aforenamed device; also in a brake and lever of peculiar construction attached to the press, and arranged in such a manner that they can be operated by the foot, so as to hold the ratchet wheel, and thereby the shaft to which it is attached, while the pawl, levers, etc., are being removed to permit the rack and platen to be raised from the bale of cotton or hay.

PUTTING UP SOAP.—W. F. George, New York city.—This invention has for its object to so put up soap into cakes or balls that it can be entirely used up, and consists in placing a piece of wood in each cake.

GATE.—C. D. Reed, Polo, Ill.—This invention relates to a new farmers' gate, which is pivoted to swing vertically, and connected with weighted levers, whereby it can be raised and lowered at will.

CORN PLANTER.—G. B. Vaughan, Marshall, Mo.—This invention relates to new corn planter, which is so constructed as to operate automatically, depositing the seed and marking the hills at the proper distances apart.

RAILWAY GATE.—Edwin Woodbury, Sharon, Pa.—This invention has for its object to furnish an improved railway gate, simple in construction and effective in operation, opening and closing automatically upon the passage of the trains.

TONGUE BRACE AND BALANCE FOR WAGONS AND OTHER VEHICLES.—A. J. Mapes, Independence, Mo.—The object of this invention is to provide a brace or support for the poles or tongues of wagons, carriages, buggies, leighs, and other vehicles, so as to hold the same in the required horizontal position, and remove their absolute weight from the animals holding them suspended.

CAR COUPLING.—G. W. Irish, Memphis, N. Y.—This invention has for its object to furnish a simple, convenient, and reliable car coupling, which shall be so constructed and arranged as to couple the cars automatically when they are run together, and which shall not be liable to become uncoupled accidentally.

CARPET BEATER.—W. H. Hankinson, New York city.—This invention relates to a new machine for beating and cleaning carpets and other fabrics and consists in a new mechanism for operating the elastic wire beaters or whips, and more particularly in a new arrangement of double-acting springs by which the strokes of the beaters are made elastic and properly yielding. The carpet is thereby prevented from injury during the beating process.

COMBINED STEAM AND GAS ENGINE.—J. A. H. Ellis, Springfield, Vt.—The chief object of this invention is to utilize the heat of the exhaust steam and that of the escaping products of combustion in a steam boiler, or either, for vaporizing gasoline, or other hydrocarbon or volatile liquid, so that the vapor thus produced may be employed for operating an engine, or otherwise generating power.

ORE PULVERIZER.—F. C. Morse, Buckskin Col. Ter.—This invention relates to a new construction of machinery for pulverizing metalliferous ores, and for scouring and burnishing the metals which pass through it for amalgamation. The invention consists in making the lower of each pair of stones or pulverizers conical, and the lower surface of the upper rotary grinder concave, to fit the lower cone. The requisite outward feed is thereby obtained.

SHIRTS.—W. H. Carroll, Columbus, Miss.—This invention relates to improvements in shirts, and consists in the application to the front and top, around the neck, or partly around it, of ribbed elastic knit goods, which, without having the slit or opening at the top, commonly employed for opening, to let the head through, in putting the shirt on and off, will yield or stretch for the purpose, thereby avoiding the necessity for having the aid slits or openings, which are objectionable in point of healthfulness and hel abor of buttoning and repairs.

COMBINED GANG PLOW, PLANTER, GUANO DISTRIBUTER, CULTIVATOR AND CHOPPER.—A. G. W. Foster Franklin, Ga.—This invention has for its object to furnish an improved machine for preparing the ground, putting in the crop, and cultivating it, and which shall at the same time be simple in construction, effective in operation, and easily and conveniently adjurted for its various uses.

COTTON SEED PLANTER.—A. C. Smith, Roaring Falls, Tenn.—This invention has for its object to furnish an improved machine for planting cotton seed, corn, peas, and other seeds conveniently and accurately, and which shall at the same time be simple in construction, and easily and conveniently operated.

TUBULAR BRIDGES.—George H. White, New York city.—This invention relates to a new and useful improvement in the mode of construction of tubular bridges, whereby the material employed is so distributed and arranged that the maximum of strength is secured to any given weight of metal or wood.

SKATE FASTENING.—Bernard Gallagher, St. John, New Brunswick.—This invention relates to a new and improved method of fastening skates to the foot, and consists in an arrangement of clamps, and an adjustable jaw and connecting bar, operated by means of a lever, whereby the skate is fastened to the sole and heel of the boot in the most secure manner.

STEAM GENERATOR.—Truckson S. La France, Elmira, N. Y.—This invention has for its object to furnish an extended heating surface and perfect circulation in steam boilers.

TAR CEMENT.—Henry M. Westman, East Boston, Mass.—The nature of this invention consists in mixing ingredients for forming a cement for coating wood, metal, and other substances, for protecting such substances from injury from the effects of the weather, water, insects, worms, etc.

PISTON PACKING.—Lawrence Turner, New Orleans, La.—This invention relates to a new packing for the pistons of steam cylinders, and has for its object to facilitate the adjustment of the rings, and prevent the straining of parts by the greater or less inclination of the machinery. The invention is chiefly applicable to marine engines, in which the rolling of the ships frequently produces a straining of the machinery and leakage in the piston.

DUMPING CAR.—William Riley, Jr., Terra Haute, Ind.—This invention relates to a new and useful improvement in cars for dumping coal, wood, or other substances or materials, whereby much time and labor is saved.

HAT POUNCING MACHINE.—James B. Brown, Danbury, Ct.—This invention relates to improvements in hat-pouncing machines, and consists in a novel and simple arrangement with two vertical mandrels, and the forms thereon, for holding and revolving the hat bodies, of a driving and shifting gear, by which the time lost in shifting from one to the other may be greatly economized.

PUMP SIPHON.—T. J. Trapp, Williamsport, Pa.—This invention consists of a pump and siphon combined, and has for its object to enable an operator, by working the pump for a few strokes, to start a flow of liquid in the siphon, after which the pump mechanism is removed from its barrel, and the liquid continues to run through the siphon without intermission until it is exhausted, or the siphon removed.

AWNING.—Louis G. Sert and Christian L. Schurr, Baltimore, Md.—This invention relates to that class of devices in which "lazy tongs" are employed to raise and lower an awning, and it consists, first, in lazy tongs, placed at an inclination in order that, after having been drawn together, they may, when released from restraint, extend themselves by their own gravity, and thus lower the awning; second, in an arrangement of devices whereby the awning, after having been lowered, may be raised by winding a stud with a key, and after having been raised may be lowered by releasing a pawl from a ratchet.

Official List of Patents.

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108,551.—HORSE HAY FORK.—Charles N. Baldwin, Wilmington, Conn.
108,552.—BORING MACHINE.—Charles N. Baldwin, Wilmington, Conn.
108,553.—METALLIC FISH NETS, ETC.—Wm. Beck, New York city. Antedated Oct. 12, 1870.
108,554.—STEAM PUMP.—G. F. Blake, Boston, Mass. Antedated Oct. 20, 1870.
108,555.—COMPASS FOR MINING.—Johan Blomgren, New York city.
108,556.—FLASK FOR CASTING STAMP SHOES FOR CRUSHING MILLS.—Henry Bolthoff, Central City, Colorado Territory.
108,557.—WINDOW BLIND.—J. P. Boyd (assignor to himself and A. H. Miller), La Porte, Ind.
108,558.—APPARATUS FOR DEODORIZING AND IMPROVING ALCOHOLIC AND VINOUS LIQUORS.—Leverett Bradley, Jersey City, N. J.
108,559.—HORSE COLLAR FASTENINGS.—August Bratnober, Webster county, Iowa.
108,560.—MELODEON.—Thomas Brett, Geneva, Ohio.
108,561.—PERMUTATION LOCK.—Edward W. Brettell, Elizabeth, N. J.
108,562.—HAT-POUNCING MACHINE.—J. B. Brown, Danbury, Conn.
108,563.—OIL-CLOTH PRINTING MACHINERY.—Alexander Fordyce Buchanan, East Newark, N. J.
108,564.—LINK FOR ENDLESS CHAIN HORSE-POWER.—G. E. Burt, Harvard, Mass.
108,565.—SNOW PLOW.—A. M. Butts, Waterbury, Conn.
108,566.—ASPHALT PAVEMENT.—Alonzo C. Campbell, New York city.
108,567.—SHIRT.—W. H. Carroll, Columbus, Miss.
108,568.—FAUCET.—Wm. F. Class and L. W. Sapp, Cleveland, Ohio.
108,569.—WORK HOLDER.—Nicholas Clute, Schenectady, N.Y., and O. W. Marshall, Hartford, Conn.
108,570.—STAMP BATTERY.—Geo. D. Crocker, Virginia City, Nevada.
108,571.—MANUFACTURE OF WHITE LEAD.—C. W. Dwelle, St. Louis, Mo.
108,572.—DEVICE FOR OPERATING SKYLIGHT.—Wm. Dyatt, New York city.
108,573.—PENCIL HOLDER.—C. A. Eaton (assignor to himself and G. F. Bolles), Minneapolis, Minn.
108,574.—COMBINED STEAM AND GAS ENGINE.—J. A. H. Ellis, Springfield, Vt.
108,575.—CLOTHES DRYER.—John Emmert, Dunleith, Ill.
108,576.—STEAM ENGINE.—Philip Estes, Leavenworth, Kansas.
108,577.—GRAIN SEPARATOR.—John G. Evans, Orrville Ohio.
108,578.—JEWELRY PIN.—Israel Farjeon, New York city, and W. H. Horton, Jersey City, N. J.
108,579.—GAS BURNER.—C. S. Ford (assignor to Chas. Young), Philadelphia, Pa.
108,580.—COTTON PLANTER.—Abraam G. W. Foster, Franklin, Ga.
108,581.—SKATE FASTENING.—Bernard Gallagher, St. John, New Brunswick.
108,582.—WOOD PAVEMENT.—Carol Gaytes, Chicago, Ill.
108,583.—GAS HEATER.—Richard George, Kilburn, England
108,584.—PUTTING UP SOAP.—W. F. George, New York city Antedated Oct. 8, 1870.
108,585.—PREVENTING THE DEVIATION OF SHIP'S COMPASS.—J. W. Girdlestone, 37 Norfolk st., Strand, England.
108,586.—PLANE.—W. B. Glover, Boston, Mass.
108,587.—GAME.—D. F. Hale, Chicopee, Mass.
108,588.—FASTENING ARTIFICIAL TEETH TO METALLIC PLATE.—H. B. Hale, Rockford, Ill. Antedated Oct. 21, 1870.
108,589.—CARPET BEATER.—William H. Hankinson, New York city.
108,590.—EXTENSION HAT RACK.—Nathan Hayden, Chicago, Ill. Antedated Oct. 11, 1870.
108,591.—POTATO PLANTER.—Theodore Herbert, Philadelphia, Pa.
108,592.—FLOWER CASKET.—John M. Hess, Philadelphia Pa.
108,593.—WIND WHEEL.—J. O. Heyworth and H. E. Fessel Chicago, Ill. Antedated Oct. 8, 1870.
108,594.—MACHINE FOR SECURING HEADS TO METALLIC KEGS—Wm. Bill, Pottsville, Pa.
108,595.—THREAD SPOOL.—I. L. Hoard, Bristol, R. I.
108,596.—POCKET CUTLERY.—D. R. Hundley, Mountain Home Ala.
108,597.—REIN HOLDER.—Davis Hurd, Lockport, N. Y.
108,598.—CAR COUPLING.—G. W. Irish, Memphis, N. Y.
108,599.—HAY AND COTTON PRESS.—J. H. Johnson, Griffin Ga.
108,600.—COTTON BALE TIE.—E. P. Jones, Sun Flower county Miss.
108,601.—KNIFE HOLDER AND GUIDER FOR HEEL-CUTTING MACHINE.—Samuel Keen, East Bridgewater, Mass. Antedated October 15, 1870.
108,602.—GALVANIC BATTERY.—Jerome Kidder, New York city.
108,603.—MEDICAL COMPOUND FOR FOWLS.—J. H. Kipp, Millerstown, Pa.
108,604.—STEAM GENERATOR.—Truckson S. La France, Elmira, N. Y.
108,605.—MACHINE FOR CUTTING HEELS OF BOOTS AND SHOES.—R. C. Lambart, South Abington, assignor to David Whittemore, North Bridgewater, Mass.
108,606.—METHOD OF COOLING BEER WORTS, ETC.—O. P Lewis, Cincinnati, Ohio.
108,607.—WAGON AXLE.—William A. Lewis, Joilet, Ill.
108,608.—WAGON AXLE.—W. A. Lewis, Joliet, Ill.
108,609.—WAGON AXLE.—W. A. Lewis, Joliet, Ill.
108,610.—TONGUE BRACE AND BALANCE FOR WAGONS.—A. J Mapes, Independence, Mo.
108,611.—MOSQUITO BAR.—Theophile Masac, Good Hope Plantation, La.
108,612.—HUB FOR CARRIAGE.—James A. Maynard, Newtonville, Mass.
108,613.—NUT LOCK.—H. W. McAuley, Sterling, Wis.
108,614.—CART SADDLE.—William B. McClure, Alexandria, Va.
108,615.—COPYING INK FOR PRINTING.—Charles McIlvaine Philadelphia, Pa.
108,616.—DRYER.—C. A. Moffatt, Indianapolis, Ind.
108,617.—ORE PULVERIZER.—F. C. Morse, Buckskin, Colorado Territory.
108,618.—LOW-WATER INDICATOR.—A. F. W. Neynaber, Philadelphia, Pa. Antedated Oct. 20, 1870.
108,619.—CANCELING STAMP.—George G. Noyes, Worcester, Mass.
108,620.—CLOTHES WRINGER.—Abiel O'Dell, Napanee, Canada.
108,621.—CHAIN LINK AND BAR.—D. A. Peloubet, Hudson City, N. J., assignor to Warren Spadone & Co., New York city.
108,622.—BED AND BED BOTTOM.—J. W. C. Peters and W. A. Le Row, Chicago, Ill.
108,623.—PAPER FILE.—S. E. Pettee and C. A. Wolle, Bethlehem, Pa.
108,624.—MACHINE FOR DRIVING NAILS.—Samuel W. Phelps, Sandusky, Ohio.
108,625.—MAP STAND.—William F. Phelps, Winona, Minn. Antedated Oct. 18, 1870.
108,626.—PADDLE WHEEL.—John W. Post, Castile, Pa Antedated Oct. 11, 1870.
108,627.—REMOVING SOLUBLE SALTS FROM ARTIFICIAL STONE.—E. L. Ransome, Greenwich, England.
108,628.—GATE.—C. D. Reed, Polo, Ill.
108,629.—CIGAR MACHINE.—John O. Reilley, Baltimore, Md., assignor to himself, Wm. W. Perkins, and C. C. Chaffee. Antedated October 15, 1870.
108,630.—INKING APPARATUS FOR COLOR PRINTING.—Israel L. G. Rice, Cambridge, Mass.
108,631.—CHURN.—J. C. Richardson, Prairie Du Chien, and Lemuel Taylor, Jordan, Wis. Antedated Sept. 30, 1870.
108,632.—DUMPING CAR.—William Riley, Jr., Terre Haute Ind.
108,633.—ELECTRO-MAGNETIC RAILROAD SIGNAL.—William Robinson, Brooklyn, N. Y.
108,634.—TIRE MACHINE.—Samuel Roe, Jr., Booneville, Mo.
108,635.—WRITING DESK.—Ernest Scheel, New York city.
108,636.—SPRING.—John M. Schmidt, New Albany, Ind.
108,637.—AUTOMATIC FAN.—John Schnell and Peter Schmitt Waterloo, Ill.
108,638.—REIN HOLDER.—F. B. Scott, Lancaster, N. Y., assignor to himself and C. S. S. Lennox, Townsend, Mass.
108,639.—AWNING.—L. G. Sert and C. L. Schurr, Baltimore, Md.
108,640.—CALIPERS.—W. A. Sharpe, Syracuse, N. Y.
108,641.—PLATES AND BARS FOR CONSTUCTION OF PLOWS CULTIVATOR TEETH, ETC.—W. H. Singer, Pittsburgh, Pa.
108,642.—SASH HOLDER.—Emerson D. Slater, Greenville N. Y.
108,643.—COTTON-SEED PLANTER.—A. C. Smith, Roaring Falls, Tenn.
108,644.—LAND MARKER FOR CORN PLANTING.—A. C. Smith, Joyner's Depot, N. C.
108,645.—CIDER MILL.—J. K. P. Smith (assignor to himself and L. S. Shuler), Jeffersonville, Ind.
108,646.—WASHING MACHINE.—S. M. Smith, Canal Dover Ohio.
108,647.—MOLDING PIPE.—William Smith, Pittsburgh, Pa.
108,648.—MACHINE FOR SHAVING THE HEADS OF SCREW BLANKS.—James F. Starrett, New York city. Antedated October 15 1870.
108,649.—CARRIAGE SPRING.—Sidney Steward, Trenton N. J.
108,650.—SPRING BED BOTTOM.—Philip Stovall, Newman Ga.
108,651.—CARPET CLEANER.—Robert Terry, and F. W. Hafkemeyer, Chicago, Ill.
108,652.—PUMP SIPHON.—Thomas J. Trapp, Williamsport, Pa.
108,653.—PISTON PACKING.—Lawrence Turner, New Orleans, La.
108,654.—SCALE BEAM.—J. H. Usher (assignor to "The Buffalo and Niagara Scale Works Company"), Buffalo, N. Y.
108,655.—MACHINE FOR ASSORTING POTATOES.—Benjamin D. Vanderveer, David A. Vanderveer, and Tunis Denise, Freehold, N. J.
108,656.—CORN PLANTER.—George B. Vaughan, Marshall, Mo.
108,657.—PRESS FOR REMOVING LIQUID MATTER FROM VARIOUS SUBSTANCES.—Jason Waters, West Sutton, Mass.
108,658.—HYDRAULIC MINING APPARATUS.—Thos. Watson, Nevada City, Cal.
108,659.—PRESERVING WOOD.—Ezra Webb, New York city

108,660.—Die for Molding Buttons.—Wm. M. Welling, New York city.
108,661.—Cement for Coating and Protecting Wood.—H. M. Westman, East Boston, Mass.
108,662.—Skate.—Corydon Wheat, Geneva, N. Y.
108,663.—Tubular Bridge.—George H. White, New York city.
108,664.—Utilizing Sewage.—George W. Wigner, London, England.
108,665.—Saw Mill.—William M. Wilkin, Kalamazoo, Mich.
108,666.—Roofing Cement.—Jas. T. Wilkinson, Lockport, N. Y. Antedated Oct. 8, 1870.
108,667.—Lamp Burner.—Lamuel R. Wilmot, Bridgeport, Conn.
108,668.—Bark-shaving Machine.—Martin Winger, Ephrata, Pa.
108,669.—Manufacture of Quercitron Bark.—Martin Winger, Ephrata, Pa.
108,670.—Railway Gate.—Edwin Woodbury, Sharon, Pa.
108,671.—Plow Handle.—W. E. Wyche, Brookville, N. C. Antedated Oct. 7, 1870.
108,672.—Planting and Fertilizing Machine.—S. L. Allen, Cinnaminson, N. J.
108,673.—Lubricating Device for Bolt-threading Machines.—William Armstrong, Kent, Ohio, assignor to himself and Ezra Miller, New York city.
108,674.—Wringing Machine.—E. G. W. Bartlett, Providence, R. I.
108,675.—Machine for Felling Trees.—H. J. Beard, New Sharon, Me., assignor to himself and James Hawes, Jr.
108,676.—Paper Cuff.—S. A. Bemis, A. E. Forth, and J. W. Goodrich, Springfield, Mass.
108,677.—Machine for Heeling Boots and Shoes.—H. H. Bigelow, Worcester, Mass.
108,678.—Machine for Finishing Heels on Boots and Shoes.—H. H. Bigelow, Worcester, Mass.
108,679.—Detachably-tipped Whip.—Pardon Boyden, Amsterdam, N. Y.
108,680.—Reeling Machine.—John Briggs, Higganum, Conn.
108,681.—Fan.—Otto Brueck, New York city.
108,682.—Piston.—I. D. Buck, Conshohocken, Pa.
108,683.—Bracelet.—Henry Carlisle, Jr., Philadelphia, Pa.
108,684.—Horse Shoe.—J. K. Christopher, Dayton, Ohio.
108,685.—Coupling Attachment for Piano.—John Clark (assignor to himself and Alfred Adamson), Philadelphia, Pa.
108,686.—Cutting Apparatus for Harvesters.—T. J. Clark and G. M. Clark, Higganum, Conn.
108,687.—Machine for Skiving Leather.—J. P. Crooks, Hopkinton, assignor to G. E. Franklin (assignor to Leonard Morris), Natick, Mass.
108,688.—Self-acting Mules for Spinning.—John Cumnock, Salmon Falls, N. H.
108,689.—Washing Machine.—Ezra Davis, Keokuk, Iowa.
108,690.—Harrow.—James Dawson, Greenwood, Ill.
108,691.—Cooking Range.—R. E. Deane, New York city.
108,692.—Rotary Disintegrator.—Henry Ducsh, Baltimore, Md.
108,693.—Concrete for Pavement, etc.—G. H. S. Duffus, Baltimore, Md., assignor to himself and H. J. Davison, New York city.
108,694.—Hollow Wick Lamp-burner.—J. W. Emerson, Milbury, Mass.
108,695.—Retort Furnace.—A. F. Du Faur, Newark, N. J., assignor to himself and Edward Balbach, Jr.
108,696.—Pavement.—L. S. Filbert, Philadelphia, Pa.
108,697.—Wood Pavement.—L. T. Follansbee (assignor to himself and G. W. Linville), Washington, D. C.
108,698.—Railway Car Coupler and Buffer.—P. G. Gardiner, New York city.
108,699.—Plow.—M. L. Gibbs, Canton, Ohio.
108,700.—Wooden Box.—William Gilbert, Catskill, N. Y., assignor to N. K. Fairbank, Chicago, Ill.
108,701.—Evaporating Apparatus.—S. D. Gilson, Syracuse, N. Y.
108,702.—Railroad Car Heater.—Pierre Grandjean, Paris, France.
108,703.—Sectional Steam Generater.—John Griffith and G. W. Wundram, New York city.
108,704.—Balance Slide Valve.—T. J. Hamer and Martin Walls, Sunbury, Pa.
108,705.—Pump.—George Hibberd, Wheeling, West Va.
108,706.—Square Sail for Fore-and-aft Vessel.—A. A. Holling, Pultneyville, N. Y.
108,707.—Cooling Buildings.—Theodore Krausch, New York city.
108,708.—Door and Alarm Bell.—G. O. Lackey, Akron Ohio.
108,709.—Drawing and Twisting Head for Spinning Machine.—S. W. Lawrence, Philo Walden, and J. W. Huntoon, West Eaton, N. Y.
108,710.—Steam Atomizer.—I. P. Leete, Philadelphia, Pa.
108,711.—Vapor Burner.—Daniel Leonard, Chicago, Ill.
108,712.—Combined Stalk and Weed Cutter and Land Roller.—William Leslie, Fort Madison, Iowa. Antedated October 15, 1870.
108,713.—Apparatus for Preparing Lakes and Colors.—John Lucas, Philadelphia, Pa.
108,714.—Stop Valve.—H. G. Ludlow, Troy, and Jabez Stone, Waterford, N. Y., assignors to H. G. Ludlow.
108,715.—Machine for Sizing and Felting Hat Bodies. G. A. Mandeville (assignor to himself and A. C. Wheaton), Newark, N. J.
108,716.—Harvester.—W. T. Miller, New Geneva, Pa.
108,717.—Corn Coverer.—I. N. Monroe, Bridgeport, Ill.
108,718.—Steam Engine.—James Montgomery, New York city.
108,719.—Peg Box for Pegging Machine.—A. W. Moore, East Brimfield, Mass.
108,720.—Carriage Clip.—F. B. Morse (assignor to himself and H. D. Smith & Co.), Plantsville, Conn.
108,721.—Machine for Cutting and Smoothing the Ends of Pencils.—T. M. Muller and H. C. Benson (assignors to Joseph Reckendorfer), New York city.
108,722.—Material for Journals and Bearings.—E. D. Murfey (assignor to the Manhattan Packing Manufacturing Company), New York city.
108,723.—Earth Excavator.—J. W. Myers, Lyons, Iowa.
108,724.—Gang Plow.—William Newlin, Attica, Ind.
108,725.—Rosette for Bridle.—James O'Brien, Cedar Rapids, Iowa.
108,726.—Flue Cleaner for Cooking Stoves.—H. L. Palmer, Stillwater, N. Y.
108,727.—Draft Equalizer.—W. M. Perkins and T. F. Vandegift, La Fontain, Ind.
108,728.—Portable Privy.—W. H. Pulver, Schuylersville, N. Y.
108,729.—Bedstead.—H. B. Ramsey, Rockville, Ind.
108,730.—Plow.—G. W. Ream, Canton, Ohio.
108,731.—Machine for Bundling Wood.—John Rushworth, New York city.
108,732.—Refining Sugar by Steam.—Francis Schleifer, San Francisco, Cal.
108,733.—Hot Air Furnace.—S. B. Sexton and G. W. Beard, Baltimore, Md.
108,734.—Curtain Fixture.—W. E. Scranton, New Haven, Conn.
108,735.—Machine for Making Staples.—James C. Stead, Jersey City, N. J.
108,736.—Cooking Range.—David Stuart and Lewis Bridge (assignors to Stuart, Peterson & Co.) Philadelphia, Pa.
108,837.—Needle.—Hannah G. Suplee, San Francisco, Cal. Antedated October 15, 1870.
108,738.—Wrench.—G. C. Taft, Worcester, Mass.
108,739.—Harness Hook.—Wm. H. Taylor, Baldwinsville, N. Y.
108,740.—Handle of Table Knife.—J. A. White, Philadelphia, Pa.
108,741.—Horse-hoe.—J. T. Whitlock, Bridport, Vt., administrator of Cyrus Whitlock, deceased.
108,742.—Machine for Making Umbrella Connections.—Edwin Wight, Philadelphia, Pa.
108,743.—Electro-magnet Alarm-gong.—Chas. Williams, Jr., Somerville, and Jerome Redding, Charlestown, Mass.
108,744.—Horse Hay Rake.—James E. Wisner, Friendship, N. Y.
108,745.—Spring for Vehicles.—H. E. Wolcott (assignor to himself and R. B. Wheeler), Elbridge, and E. B. Hoyt, Skaneateles, N. Y.
108,746.—Paper File.—William L. Woods, Washington, D. C.
108,747.—Wrench.—E. J. Worcester, Worcester, Mass.
108,748.—Shingling-bracket.—E. J. Worcester, Worcester, Mass.

REISSUES.

4,160.—Method of Ornamenting Tin, etc.—Louis Fitzmaier, New York city, assignor to Atwater, Benham & Company.—Patent No. 67,184, dated July 30, 1867.
4,161.—Water-reservoir for Cooking Stoves.—C. O. Green, Troy, N. Y.—Patent No. 88,160, dated March 23, 1869.
4,162.—Division A.—Holder for Neckties.—Wm. H. Hart, Jr., Philadelphia, Pa.—Patent No. 76,186, dated March 31, 1868.
4,163.—Division B.—Box for Packing Neckties.—W. H. Hart, Jr., Philadelphia, Pa.—Patent No. 76,186, dated March 31, 1868.
4,164.—Chair-seat.—O. A. Bingham, Ashburnham, Mass., assignor to G. C. Winchester.—Patent No. 94,583, dated September 7, 1869 reissue No. 3,890, dated March 22, 1870.
4,165.—Division A.—Reservoir for Wells.—R. H. Dewey and E. N. Tillotson, Chicago, Ill., assignor to E. N. Tillotson and W. E. Tillotson.—Patent No. 53,584, dated April 3, 1866.
4,166.—Printing Telegraph.—T. A. Edison, Newark, N. J., assignor, by mesne assignments, to the Gold and Stock Telegraph Co.—Patent No. 91,527, dated June 22, 1869.
4,167.—Water-supplying Apparatus.—John C. Hagan, Nashville, Tenn., assignor of one-half interest to James Walker, Isaiah D. Walker, and Ivan N. Walker.—Patent No. 104,019, dated June 7, 1870.
4,168.—Manufacture of Gas from Hydrocarbons.—Joshua Kidd, New York city.—Patent No. 106,699, dated August 23, 1870; patented in England January 5, 1864.
4,169.—Self-regulating Windmill.—The Continental Windmill Company, New York city, assignees of A. P. Brown.—Patent No. 13,156, dated July 3, 1856.

DESIGNS.

4,428.—Match-safe.—F. W. Brocksieper (assignor to Sargent & Co.), New Haven, Conn.
4,429.—Keeper for Door-locks.—H. H. Elwell, South Norwalk, Conn.
4,430 and 4,431.—Face Plate for Locks.—H. H. Ellwell, South Norwalk, Conn. Two patents.
4,432.—Keeper for Door Locks.—Henry H. Elwell, South Norwalk, Conn.
4,433.—Cooking Stove.—William Hailes, Albany, N. Y.
4,434.—Parlor Stove.—William Hailes, Albany, N. Y.
4,435.—Carriage-bed.—Henry Killam, New Haven, Conn.
4,436.—Head-band.—W. S. Mingis, New York city.
4,437.—Table Caster.—Wm. Parkin (assignor to Reed & Barton), Taunton, Mass.
4,438.—Caster Bottle.—Wm. Parkin (assignor to Reed & Barton), Taunton, Mass.
4,439.—Drilling Machine.—Francis A. Pratt (assignor to the Pratt & Whitney Company), Hartford, Conn.
4,440.—Fruit Stand.—Herman Vasseur (assignor to Simpson, Hall, Miller & Co), Wallingford, Conn.
4,441.—Tea Set.—Herman Vasseur (assignor to Simpson, Hall, Miller & Co.), Hartford, Conn.
4,442.—Group of Tools, Machinery, etc.—E. A. Ellsworth, Washington, D. C.
4,443.—Dress Trimming.—Martin Landenoerger, Philadelphia, Pa.
4,444.—Floor Oil-cloth Pattern.—Jeremiah Meyer, Kearney, N. J., assignor to John Jewett & Sons, New York city.
4,445.—Toy Carriage.—Frederick W. Porter, Springfield, Vt.

TRADE-MARKS.

No. 1.—Liquid Paint.—Averill Chemical Paint Company, New York city.
2.—Mustard.—J. B. Baldy & Co., Toledo, Ohio.
3.—Retail Coal.—Ellis Branson, Philadelphia, Pa.
4.—Fish.—Tracy Coit, New York city.
5.—Oyster Packing.—Wm. Lanfair Ellis & Co., Baltimore, Md.
6.—Wrought-iron Pipe.—Evans, Clow, Dalzell & Co., Pittsburgh, Pa.
7.—Snuff.—W. E. Garrett & Sons, Philadelphia, Pa.
8.—Car Wheel.—W. G. Hamilton, New York city.
9.—Soap.—John K. Hogg, Frederick, Md.
10.—Woolen Hose.—Abraham P. Olzendam, Manchester, N. H.
11.—Ham.—William Ryan, Dubuque, Iowa.
12.—Dry Goods.—Dale, Ross & Co., Philadelphia, Pa.
13.—Polishing Preparation.—The Buffalo Magic Polishing Company, Buffalo, N. Y.
14.—Yeast Powder.—H. K. Thurber & Co., New York city.
15.—Whisky.—H. K. Thurber & Co., New York city.
16.—Fertilizing Compound.—J. J. Turner & Co., Baltimore, Md.

EXTENSIONS.

Paper-folding Machine.—Cyrus Chambers, Jr., of Philadelphia, Pa.—Letters Patent No. 15,842, dated October 7, 1856; reissue No. 4,079, dated July 26, 1870.
Making Ax-polls.—D. P. Estep, Pittsburgh, Pa.—Letters Patent No. 15,880, dated October 14, 1856.
Manufacture of Caustic Alkali.—George Thompson, of Philadelphia, Pa.—Division A.—Letters Patent No. 15,957, dated October 21, 1856; reissue No. 654, dated February 1, 1859; reissue No. 2,569, dated April 16, 1866.
Process of Putting up Caustic Alkali.—George Thompson, of Philadelphia, Pa.—Division B.—Letters Patent No. 15,957, dated October 21, 1856; reissue No. 654, dated February 1, 1859; reissue No. 2,570, dated April 16, 1867.
Manufacture of Caustic Alkalies.—George Thompson, of Philadelphia, Pa.—Division C.—Letters Patent No. 15,951, dated October 21, 1856; reissue No. 654, dated February 1, 1859; reissue No. 2,571, dated April 16, 1867.

NEW BOOKS AND PUBLICATIONS.

Elementary Treatise on Mechanics. For the Use of Colleges and Schools of Science. By William G. Peck, LL.D., Professor of Mathematics and Astronomy in Columbia College, and of Mechanics in the School of Mines. 12mo., pp. 296. New York: A. S. Barnes & Co. Price, by mail, $2·25.

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Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

2,463.—Mode of Operating the "Gatling" and other Guns of like Character.—George O'Kinne, Hartford, Conn. September 13, 1870.

2,492.—Manufacture of "Bunches" or "Fillers" for Cigars, and the Preparation of the Tobacco therefor.—Adolph Pearl, Brooklyn N. Y. September 15, 1870.

2,496.—Steam Generators.—Robert Patterson, Catskill, N. Y. September 16 1870.

2,498.—Life Boat.—Robert Humble, Milwaukee, Wis. September 16, 1870.

2,508.—Apparatus for Forming Wire into Spiral Coils.—H. E. Towle, New York city. September 17, 1870.

2,544.—Manufacture of Hydrocarbon Oils from Bituminous Substances.—Joshua Merrill, Boston, Mass. September 22, 1870.

2,545.—Improvements in the Cutter Heads and Cutters of the Woodworth or Cylindrical Wood-planing Machines.—John More, New York city. September 22, 1870.

Advertisements.

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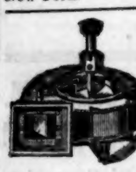

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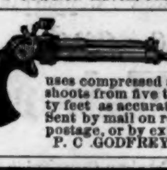

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